RAILROAD GAZETTE

FRIDAY, OCTOBER 1, 1897.

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Contributions.

Excursion Rates.

SEPTEMBER 21, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have become so tired of seeing special excursion rates made to and from any point that can scare up a few people that want to travel a little, that I think the following proposition worthy of discussion: Make a rate of one-half the usual fare for anybody and everybody during July, August and September and let it go at that. Make no excursion rates of any kind at any other time of the year. This would tend to steady the summer travel and to discomfit the scalper. What do you think of it? GENERAL MANAGER.

The First Basic Open-Hearth Steel in America.

The Wellman-Seaver Engineering Co.,
CLEVELAND, O., Sept. 21, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have been very much interested in and feel highly complimented by the article by Mr. Condron on Open-Hearth Steel and its Manufacture by the Illinois Steel Co., in your issue of Sept. 3. There is one statement in the article, however, which is not correct. Mr. Condron states, "The first basic open-hearth steel made in this country was made at the Homestead Works of Messrs. Carnegie, Phipps & Co., in March, 1888."

The first basic open-hearth steel made in this country was made at the works of the Otis Steel Co., of this city, under the immediate supervision of Mr. George W. Goetz. One furnace was started on Jan. 19, 1886, with a magnesite bottom, the magnesite being imported from Austria in the fall of 1885. This furnace was kept at work making basic steel until April 6, 1886, making in all something over 1,000 tons of ingots.

This being the first manufacture of this kind of steel in this country, it was, of course, not entirely satisfactory. Just about that time the company became very hard pressed for steel to fill their orders and they decided to stop the manufacture of basic steel, as it was experimental. The bottom was, therefore, taken out and the furnace was put at work again on their regular make of acid steel. S. T. WELLMAN.

A Government Armor Plate Works.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Do you consider that the investigation being carried on by the Armor Plate Board, with regard to establishing a government armor plate factory, is serious, or is it a mere bluff? You will notice that in course of the hearings Representative Livingston, of Georgia, has said that the Bethlehem Works and Carnegie have bought a large portion of their iron in the South. This must be either impudence or ignorance, and perhaps both. Probably not a ton of Southern basic iron has ever been used in armor plate. Most of the pig iron used for this product is very pure Swedish.

You will observe further that Tom Platt, that patriot and economist, and Stewart, of Nevada, that other almost equally eminent patriot and economist, think that the government has slighted the South in the distribution of plums and urge a site in Tennessee or Alabama. But supposing local pig iron could be used for armor plate, which I deny, what is to be done for skilled workmen in case a Southern site is chosen? O. H. S.

[In a certain sense this investigation is serious. For many reasons the administration wants to reduce the price of armor plate. This would be "good politics" and it would work in with the notion of building a great navy. If the inquiry now going on makes it even remotely probable that the government could establish and run an armor plate works with such economy as would reduce the price of armor plate, this would be an admirable club to hold over the heads of the Carnegie and Bethlehem people. It does not follow, however, that the government is at all likely to build an armor plate works.—EDITOR RAILROAD GAZETTE.]

The Theory of Brake Shoes.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to your editorial of Sept. 24, "A Contribution to the Theory of Brake Shoes," I find it very good, and your points are perfect in all respects but one, where you speak of a change in the brake leverage. In this regard I wish to say that the friction of the Kinzer shoe is wholly in the control of the manufacturer, much more so than the friction of the metal shoes, and can be regulated to suit the necessities of the case. I would also say that up to the present time we have no cause for complaint of this kind, having made special tests both mixed with iron shoes and all Kinzer shoes, and we find no change in leverage necessary. J. J. KINZER.

[The results of the M. C. B. laboratory tests are undisputed, and plainly show that no change in leverage is necessary where soft composition brake shoes, such as were used in the laboratory test, replace shoes of soft cast iron. However the point raised by Mr. Kinzer deserves attention. In the case of the Kinzer composition shoe the friction can be varied by changing the proportion of plumbago in the mixture. By increasing the amount of plumbago, the wearing qualities of the shoe can be increased while the mean co-efficient of friction is lowered. The proportions of a composition which will give a mean co-efficient of friction slightly higher than that of soft cast iron have been determined by experiment, and if it should become necessary this mean co-efficient could be lowered, but it would not be desirable.

We are in receipt of a letter from a Superintendent of Motive Power of an important railroad who has conducted extensive tests of soft composition brake shoes. We quote a part of it as the opinion of a very careful investigator. "The indications up to the present time are that for friction-producing qualities composite shoes give great promise, and that sufficient durability may be obtained to make them thoroughly practicable, particularly for passenger train service. The principal difficulty found thus far with composite shoes has been that the filling would fall out, but that this can and will be overcome there is little doubt. One marked advantage of the composite shoe is that the uniformity of the friction in each individual case of a large number of shoes is greater, and the friction is more constant at variable speeds, besides being devoid of the great increase that takes place with most brake-shoe materials just prior to a stop at the end of an application. The brake-shoe question has received great stimulus since the M. C. B. tests, and a great deal has been accomplished in some directions."—EDITOR RAILROAD GAZETTE.]

Railroad Matters in England.

Agricultural Rates.—The reduction in agricultural rates on the Great Eastern, of which I have more than once spoken, appears to have been a great success. In the year 1896 no less than 60,000 packages of agricultural produce were carried at the new reduced rates. To show the rapid increase which is taking place in this traffic it is stated that whereas in the first two months of 1896 there were carried 3,000 packages, in the two corresponding months of 1897 the number was 12,000. Quite recently the Scotch newspapers have reported that the Scotch railroad companies have agreed to reduce the agricultural rates by one-half. No doubt the amount of the retion is exaggerated, but it is evident that substantial reductions are to be introduced.

Passenger Service.—The improvements in passenger train service are very considerable, though in point of speed there is actually a falling off from the highest point reached in the summers of 1895 and 1896, which was on the trains between London and Scotland. Good work on these trains is however still being done, more especially in Scotland by the Caledonian Company. On a recent occasion one of the down expresses, with a load of 270 tons, exclusive of engine and tender, covered the 101 miles between Carlisle and Edinburgh in 102 minutes. Carlisle is practically at sea level, and so is Edinburgh, but between the two there are two summits of 1,009 and 870 ft. respectively, with a fall to about 300 ft. between them.

Two new departures are to be chronicled, both due to the Great Eastern. The first is a half hourly service, continued all through the night, between their Liverpool Street terminus and a suburban station named Walthamstowe, about 9 miles off. This is said to have already succeeded beyond all expectation. The second is a train at midnight on Saturdays from London to Clacton, a seaside resort—with supper car attached to enable actors and others who cannot leave London earlier to spend the whole of Sunday by the seaside. Passengers can if they please take a ticket including not only the journey but board and lodging till breakfast on Monday at the Clacton hotel.

Long Runs.—The Great Eastern has this summer laid down water troughs on its main line, with the result that it now runs between London and Walsham, a distance of 131 miles, without a stop, and so for the first time obtains a place among the companies performing 100 miles and upward without stopping. Eighteen months ago I gave a list of these runs, then 35 in number. According to a table recently published in the *Daily News*, which I have not verified but which is apparently accurate, there are now no less than 68 of them. Out of the 68 the bulk are to be credited to 3 companies; the Great Western has 12, including the longest, Paddington to Exeter, 194 miles in 3 hours 43 minutes—equals 53.4 miles per hour—and the fastest, Paddington to Bath, 107¼ miles in 1 hour 57 minutes—equals 54.9 miles per hour; the London & North Western has 15, of which no less than 7 are above 150 miles, while the Great Northern has 19. So the number of long runs is in inverse proportion to the mileage of the three companies in question.

The Great Western train, which covers the 194 miles without stopping, does a still more meritorious performance after leaving Exeter, in that it accomplishes the 52 miles to Plymouth in 72 minutes. Of these 52 miles 30 are over gradients almost as severe as anything to be found on a main line in any country. The railroad is known as the South Devon. It was originally designed by Brunel for atmospheric traction, on which system it was actually worked for some months, and the gradients were accordingly never intended for locomotives at all, being for a good many miles as bad as 1 in 39 and 1 in 40. On the whole, I am inclined to think that the Cornish express, which runs from London to Plymouth, 236 miles in 307 minutes with one intermediate stop, is altogether the most creditable train at present running in the British Isles.

Dining Cars for Third Class.—Dining cars have existed in England for nearly 20 years, but till quite recently they have only been available for first-class passengers. Four years ago dining cars for third-class passengers also were introduced between London and Scotland, between which points the traffic is almost entirely third-class. One route from Scotland passes through Leeds, consequently dining cars between London and Leeds being available for third-class passengers by this route, the other route was constrained to follow the example on its local London and Leeds service. Naturally Liverpool and Manchester complained that similar accommodation was not afforded to them. Thereupon the Midland company, which carries an unusually small percentage of first-class passengers, adopted, if I am correctly informed, a practice of allowing third-class passengers to use the first-class dining car without extra charge. Theoretically they were required to leave the car when they had finished their meal; practically of course they sat still and refused to budge. Habitual passengers between London and Manchester soon got to know of this and booked when they wanted to dine *en route* third-class by the Midland rather than first-class by the London & North Western. So now it is announced that from the 1st of September the North Western will run third-class as well as first-class dining cars both from Liverpool and Manchester.

One point more in this connection. The afternoon express between London and Paris via Folkestone and Boulogne, which, it will be remembered, carries third class passengers, has proved a great success, and its success has encouraged the South Eastern Company to take a novel departure. They have acquired possession not only of a hotel at Boulogne, but of the buffet at the harbor railroad station which had the reputation of being the dearest refreshment room in Europe, and they propose to encourage to the utmost the traffic between Boulogne and London.

Light Railroads.—The Light Railway Commissioners have now nearly finished dealing with the schemes submitted for their consideration in November last, and a second batch embracing about 30 schemes now await their consideration. I cannot say that a perusal of the requirements contained in the order for the Basingstoke & Alton Railroad, which has just been issued, is likely to encourage light railroad promoters in the future. On a line whose speed is limited to 20 miles an hour the minimum weight of rail must be 60 lbs. per yard. Wherever the railroad crosses a road on the level gates shall be provided so constructed as to close off altogether alternately the railroad and the road, and unless specially exempted by the Board of Trade a person shall be always in attendance to close and open them. Apparently unless the company construct special passenger rolling stock for use on the line they will be required to erect permanent platforms not less than 3 ft. in height. The expense of complying with these regulations is, of course, a trifle to the rich South Western Company, which promotes this particular line, but it would hopelessly crush local promoters in not a few cases.

Resignations.—Two of the best known men in the English railroad world have just sent in their resignation—Sir Henry Oakley and Sir Charles Scotter. Sir Henry, who has seen nearly 50 years of railroad service and has long been the dean of the English general managers, began life as a clerk in the House of Commons. In 1849 Mr. Denison, a member of Parliament and Chairman of the just opening Great Northern Railway,

offered him a post in the head office at Kings Cross, and at Kings Cross he has been ever since. As a young man he was largely instrumental in detecting the most colossal fraud ever perpetrated on English railroads, by which the then Registrar, Leopold Redpath, issued over £200,000 worth of unauthorized stock, and received and spent the proceeds.

Through the positions of Accountant and Secretary he advanced to the post of General Manager, which he reached as long ago as 1870. For many years he has also acted as Honorary Secretary of the Railway Association, and in that capacity has been the official channel of communication between the railway companies and the government. To the International Railway Congress, when it met in London in 1895, he acted as General Secretary. Possessing troops of friends, and it is safe to say not a single enemy, he exchanges, at the age of 74 years, but still possessing the activity and vivacity of youth, the ceaseless drudgery of the general managership for the dignified ease of a seat on the Board of Directors.

Sir Chales Scotter is a much younger man, but his railroad service has been almost as long. His first important appointment was as Manager of the Continental goods traffic of the Manchester, Sheffield & Lincolnshire Railway, which company has, by the way, changed its name in the last few days to the Great Central Railway. After serving this company for some years as Goods Manager he was, in 1885, appointed General Manager of the London & South Western, at that time probably the most unpopular line in the country. It is now perhaps the most popular. Meanwhile the interests of the shareholders have not suffered. Elsewhere the percentage of working expenses has increased; on the Southwestern it has diminished, but the staff are apparently perfectly contented. Dividends have gone up and the market value of the ordinary stock is not far short of double what it was 12 years ago. A dozen years back the inhabitants of Southhampton, smarting under the recent removal of the headquarters of the great Peninsular & Oriental Company to London, would have liked to burn in effigy the General Manager of the London & South Western. Last year, with the trade and population of their town increasing by leaps and bounds and new dock works under construction all round them, they conferred on the General Manager the freedom of their town. Sir Charles Scotter has, like Sir Henry Oakley, been appointed a Director of the company he has so well served.

London, Sept. 1, 1897. W. M. Acworth.

American Society of Railroad Superintendents.

The 27th meeting of this society was held at Nashville, Tenn., Sept. 22 and 23. Only about 20 members were present, many being kept at home by pressure of business and others by fear that the quarantine regulations of Southern Boards of Health might cause delays in getting to or from Nashville and Chattanooga.

President Charles B. Price (A. V.) was in the chair and made an opening address outlining the work of the meeting. Secretary C. A. Hammond was detained at home and Seely Dunn (L. & N.) was appointed Acting Secretary. About 30 new members were elected and applications were received from two telegraph superintendents and a roadmaster for associate membership, these last being referred to the Executive Committee.

The Secretary's report showed a membership of 256, which the 30 new members will increase to 286. The Secretary had received during the year $1,704, a gain of $295 over the previous year. The Secretary referred to the varying personnel at the successive meetings of the society, only about 10 per cent. of the members attending, as a general thing, and discussed propositions for increasing the usefulness of the society. He suggested a permanent secretaryship, with headquarters in some large city, and perhaps a monthly bulletin. The report concluded with obituary notices on the three members of the society who had died during the year, J. R. Kendrick, K. H. Wade and H. B. Chesley.

The several committee reports were read. These were given in the last issue of the *Railroad Gazette*. The first one was that of the Roadway Committee, on Preservation of Ties. The discussion was very brief. Col. J. R. Shaler, Superintendent of the Panama Railroad, being asked his experience, said that the ties on his road were made of lignum-vitæ, costing $1.80 each. This year he is trying cypress. For piling, the Panama road uses creosoted timber.

The report on Discipline brought out a spirited discussion on the abolition of suspensions, with reference to the action of a number of large roads in following the plan of the Fall Brook Railroad. Mr. Martin (L. & N.) related his experience of two years with discipline without suspensions. Brown's discipline has been put in force in the train service department only. Mr. Martin is well satisfied with it although at first he was opposed to it. Credits are given (one year's clear record offsets a fifteen days' suspension). If a man has nothing against him no credits are entered. Of the few men dismissed for an accumulation of demerits all belong to that class who would soon be discharged under any plan of discipline. It is only the undesirable men who make bad records. The speaker believed in applying this plan to section foremen. In that department suspensions are unprofitable to the company, especially at the busy season; and if a foreman is an inefficient man his own record will in time drive him out of the service.

The men like the new plan, though many of the best of them say they would prefer actual suspensions; this shows that the men are pretty sure to try to keep their names off the record. The thick-skinned men who at first laughed at the new plan have become sobered. The bulletins are very effective, as all hands identify names and places, notwithstanding these are omitted from the bulletin.

Mr. Martin's remarks were met with various criticisms and inquiries from superintendents who had not deemed it wise to abolish suspensions. One of them said that while two years ago he thought he was going to be converted to Brown's discipline, he now thought that he did not like it. One cited the case of an engineman with a long and clear record, who carelessly backed off a misplaced switch and tipped over a car of beef. This was very annoying to the superintendent, but the engineman made a handsome apology and acknowledgment, and was not suspended. This was evidently intended as an argument against "book discipline," though the application is not very clear. Another told of a street-crossing watchman who went to sleep and endangered a number of carriages. Would it be right to discipline such a man by "suspending" him on paper only? All the people of the town know of his negligence, and if they see him continuing at his post they will charge the road with very lax discipline. It was charged that under the Fall Brook plan very small offenses are magnified. But notwithstanding the objections brought up, this and other speakers admitted that all who had tried the Fall Brook plan seemed to be thoroughly satisfied with it.

Col. J. R. Shaler, an old military officer and many years ago Superintendent on the Panhandle road, spoke of discipline as enforced in the army and on railroads. On the Panhandle he had fines, which were preferable to suspension. He regarded fines as the very best punishment for offenses not deserving dismissal. A man would feel a $5 fine worse than a 50-day suspension. The speaker, had, however, never been able to establish fines on any other road. Colonel Shaler thought that Brown's plan seemed to offer more possibilities of good results than anything he knew of, and he expressed himself as much impressed by the report of the committee; and, on his motion, the society passed a vote of thanks to the committee. In reply to questions, Colonel Shaler said that of course he would not bind himself to apply "book suspensions" by any blind or rigid rule. Sometimes a man deserves punishment, or even dismissal, when nothing very definite is proved against him. Once on a time an engineman, lately promoted from fireman, became so confused at a meeting point, where there were two other trains, that Colonel Shaler told him that he was not qualified to be an engineman and at once relieved him from duty.

Mr. Martin, replying to questions, said that his road had no scale of penalties. There is no such thing as a fixed number of days for specified offenses.

Mr. Price spoke of the value of individual records, which he has kept for 10 years. He notes merits as well as demerits. He finds the records valuable, even in the cases of employees whose past history he thinks he has pretty well fixed in his memory. Mr. Price also posts bulletins, describing the action taken in cases of discipline, and has done this for many years. His road, however, has not abolished suspensions.

Mr. Gardner (B. R. & P.) spoke in favor of Brown's plan, although he had not yet succeeded in inducing the management of his road to adopt it. He has about 40 freight train crews, and to provide for absences, from all causes, he has to have about 20 extra crews, and he deems it highly important to reduce this number.

It was stated that on the Chesapeake & Ohio individual records are kept and bulletins are issued giving accounts of discipline in case of train accidents, etc., but there is no debit and credit record with individual employees, and it is hardly correct to say that the road has adopted the Fall Brook plan. Another speaker thought that, from the various statements made in the discussion, the conservatives who do not abolish suspensions were gradually coming to use methods similar to those of the roads which have abolished them.

The discussion ended with the forenoon session. In the afternoon Mr. Martin presented statistics of the results of Brown's discipline on the Louisville & Nashville, which were published in the *Railroad Gazette* of Jan. 15 last. These figures, for some of the divisions, are for less than a full year. They may be briefly summarized as follows: Kentucky Central Division, 176 employees, 48 disciplined: wages saved, $2,144. L. C. & L. Division, 234 men, 39 cases of discipline; wages saved, $1,760. S. & N. and B. M. Divisions, 487 men, 118 cases of discipline; wages saved, $4,582. On the Kentucky Central Division five men who had been disciplined had cleared their records by earning credits. (A suspension of fifteen days is canceled by a clear record of one year, and the man interested is notified. Longer suspensions require longer clear records.) On the L. & N. the bulletins show the amount of damage occasioned by accidents.

In the discussion of the report of the Committee on Economical Train Load, Mr. Niles (L. S. & M. S.) gave figures showing the increase that had been effected in the average carload on his road during the past three or four years. The westbound load had been increased since 1894 from about 14,000 lbs. to 17,000 or 18,000; the eastbound load had in 1894 averaged 25,000 lbs., and in 1896 over 27,000; and for one month in 1897 the average was 31,000 lbs. Where there is a demand for prompt shipment, regardless of whether cars can be fully loaded, the operating department decides whether the competition is of sufficient importance to warrant compliance with the demand. In some cases it is found practicable to run these lightly loaded cars only three times a week instead of every day. In many kinds of freight the competition is now very sharp. Westbound freight trains run from New York to St. Louis in 60 hours and do not stop any oftener than fast express trains. About 30 per cent. of the eastbound freight of the Lake Shore has to be carried in fast trains.

By ascertaining the actual weight of trains the Lake Shore has made a material increase in the average load per train. The standard engine on the main line, which in September, 1896, hauled an average fast freight train, eastbound, weighing 999 tons, now averages 1,059 tons. On slow trains the average in 1896 was 1,401 tons; this year, 1,547 tons. To make suitable allowances for slippery rails in the early morning the load prescribed for engines at those hours of the day when the track is pretty sure to be dry is about 11 per cent. greater than in the unfavorable hours.

Mr. Gardner (B. R. & P.), described his experience in loading trains on the tonnage basis. His Class P engines, 18 in. × 24 in., haul 625 tons where the ruling grade is 54 ft. per mile. His new Class C engines, 21 in. × 26 in., weighing 87 tons, haul 812 tons. These new engines have 73 tons on the driving wheels; the drivers are 55 in. in diameter. (One of these engines was described in the *Railroad Gazette* last week.)

Mr. Martin (L. & N.) has greatly increased the service from his engines on some trains by loading on the tonnage basis. With trains made up exclusively of grain he has, however, found it economical to reduce the load, so that the average number of cars put into a train is about two less than formerly.

The report on Economy in Fuel and Oil elicited only brief discussion. Mr. Lewis (C. & O.) said that the reports comparing the work of different enginemen, regardless of the engines on which they worked, were found highly satisfactory on that road. The men closely watch the records and active emulation is stimulated.

Mr. Niles (L. S. & M. S.) stated that his road, like the C. & O., makes up the records of men as well as of the engines. Small premiums are paid, based on the general performance of the men. Fifteen dollars for a first premium and one-half that amount to the firemen. [Periods not stated.] There is a second premium of $10, and enginemen in the switching service also have a chance to get a $10 premium.

The Committee on Signaling reported that the subject of manual block signaling on single-track railroads was under consideration, but the committee was not yet ready to make a report.

Mr. Lewis (C. & O.) related his experience in the use of the space interval on his division of 142 miles for two years. The average length of the blocks is six miles. Each station has a semaphore and a separate train-order signal on the same post. Very little permissive blocking is allowed, but the heavy freight trains get over the division in an average of 10 hours, and the average speed of freights, including time freight trains, is 9½ hours. The use of the space interval has resulted in a remarkable freedom from accidents. Where permissive signaling is allowed, as in the case of a great rush of freight, caution cards are issued, and the entire responsibility is placed on the train receiving the card. The principal difficulty with the space interval on the C. & O. is the inadequacy of the side tracks, but new ones will soon be put in at eight or ten places, when it is expected that 50 per cent. more trains can be handled, while yet maintaining the absolute block system. The two sidings at a signal cabin are not made to overlap each other, as, where the space interval is used, this is not regarded as an advantage. If eastbound and westbound freights wait at such a place for a passenger, the one to follow the passenger must remain on the siding for some time in any event, and this gives time for the train moving in the opposite direction to get out of the way. Trains are not permitted to use sidings between block stations except on the authority of a 31 order. Where there are two sidings at a station a train which is to be set off at that station must be run in at the first end of the first siding. Caution cards are used mostly for local freight trains. The train dispatcher has to report daily to the Superintendent how many such cards have been issued and why their use was deemed necessary.

This ended the discussions and the next business was the presentation of the Treasurer's report, which showed $1,457 on hand, considerably more than a year ago. The constitution was amended so as to give the Executive Committee authority to decide both the time and the place of the annual meeting and the by-laws were amended to conform to this change. The Executive Committee was empowered to authorize clerical assistance for the Secretary. The constitution was also changed so that each standing committee shall hereafter consist of nine members, the intention being to have sub committees in different parts of the country, the members of which can act together without making long journeys.

The election of officers resulted in the re-election of President C. B. Price, Secretary C. A. Hammond and Treasurer R. M. Sully. Seely Dunn (L. & N.) was elected First Vice-President and G. R. Brown (Fall Brook) Second Vice-President. The thanks of the Asso-

ciation were voted to the Hotel Tulane, to the local Committee of Arrangements and to the railroad companies which had entertained the members. Superintendent M. J. C. Wrenne, of the Nashville, Chattanooga & St. Louis, the resident member of the Committee of Arrangements, was constant in his efforts for the pleasure of the members, and on Thursday afternoon took them to the famous Belle Meade stock farm of Colonel Harding, six miles from Nashville. He also escorted them to the Tennessee Centennial Exhibition. The Nashville, Chattanooga & St. Louis, the Southern and the Seaboard Air Line have extensive displays at the exhibition. On Friday the Nashville, Chattanooga & St. Louis took the members and their wives and guests to Chattanooga, where a day was spent at the Chickamauga battlefield and Lookout Mountain. On Saturday a portion of the members were the guests of the Louisville & Nashville on a trip to Mammoth Cave.

There were no exhibits at the convention, but Mr. A. Morrison, of Dilworth, Porter & Co., was present with samples of Goldie spikes and the company's tie plates. Mr. J. W. Thomas, Jr., Assistant General Manager of the Nashville, Chattanooga & St. Louis, showed the superintendents the very complete pneumatic interlocking plant at the Union station in Nashville. This pneumatic apparatus, in which no electrical power is used and no manual power except that necessary to handle miniature levers, was described in the *Railroad Gazette* of Jan. 17, 1896. The Union station plant, however, has been completed only a few months. This contains about 40 levers, the previous installations being smaller. The apparatus was devised by Mr. Thomas and was made at the company's shops in Nashville. Compressed air, working on the same principle, is used to actuate automatic block signals between the Union station in Nashville and the Centennial Exposition grounds, about two miles. During the Exposition, trains are run over this portion of the road at 15-minute intervals for 18 hours every day.

The Providence Station of the New York, New Haven & Hartford.

The accompanying photograph is the best yet taken of the new railroad station buildings at Providence, and shows conditions as late as Sept. 10. The view shows the southerly or street frontage of the buildings, and is taken looking northwesterly. The rather peculiar front arrangement can be clearly understood at a glance. A plan of this station was shown in the *Railroad Gazette* of Sept. 22, 1893; and in the issue of July 12, 1895, we gave some details of the bridge work, with views and notes showing the progress of the undertaking down to that time. Attention may be called to the following special points.

The detached building in the immediate foreground is called the express building, two floors of which are accessible by teams. While this building proper is only 65 ft. wide there is a basement annex extending under the track platform, and giving a total easterly basement frontage of 100 ft., which is provided with five archways of red granite, under which the large express teams can back up to the interior platform to receive and discharge their freight entirely under cover. The roof of this express basement annex is of I-beams, with brick arches, leveled up on top with concrete and finished with rock asphalt mastic.

The floor at the track level is also directly accessible for team service by means of the private court between the baggage and express buildings. Access is also had to this floor direct from the tracks and at the level thereof, one stub track next to the express and baggage buildings being available to devote to the uses of these buildings.

Looking westerly along the line of the buildings across the asphalted court, 60 ft. wide, between the express and baggage buildings, the baggage building is seen. Team access is had thereto from this same court. The baggage room floor is about at track level and is 5 ft. above the level of the easterly colonnade, which is clearly shown in the view, with its polished granite columns.

Beyond this colonnade comes the main waiting-room with its attached minor service rooms, and then on the westerly end of the main waiting-room comes a duplicate colonnade and beyond that the restaurant building, matching in size and exterior appearance the baggage building, being 70 ft. sq. outside.

Another court 60 ft. wide intervenes between the restaurant building and the office building, which is seen at the extreme left of the view. As the baggage and restaurant buildings match each other, so do the office and express buildings at the extreme ends of the line, in general effect, though there is no basement annex required for the office building. The office building (and also the express building) is 60 ft. × 125 ft. and is three stories high above the basement; that is, from the track side it shows three stories in height and from the street frontage four stories. Ample accommodations, complete and modern in arrangement are provided in this fine building for all the officials of the standard steam railroad business now located in Providence with a provision of practically one-third for growth and expansion.

The general arrangement of street approach grades at the front of this group of buildings is perhaps more clearly indicated by the view than could be done by any line profile. The aim has been at this station, and is well attained, to bring the public to the station level at three principal points, namely, at the center immediately over Francis street, which is 100 ft. wide and passes directly under the station, and at the two colonnade entrances, 115 ft. in each direction from the center over Francis street. From these colonnades easy inclines lead up to the general level of the waiting-room and to the ticket office therein, and also down 4 ft. to the level of the subways which afford passage under the through tracks, avoiding crossing at grade. Stairways in the track platforms give communication to and from these platforms and the subways. Access is also had from Francis street beneath the station to these subways by means of easy stairways.

The situation of the colonnades is such that a good proportion of travel, probably one-half or more, will have little occasion to go through the general waiting-room, to their own advantage as well as the advantage of those necessarily occupying the waiting-room. This feature of very direct ingress and egress to and from the street and the train platforms is one of the commendable features of this station; the arrangement of inclines is another, and the large and well-lighted and ventilated waiting-room with service rooms attached is another.

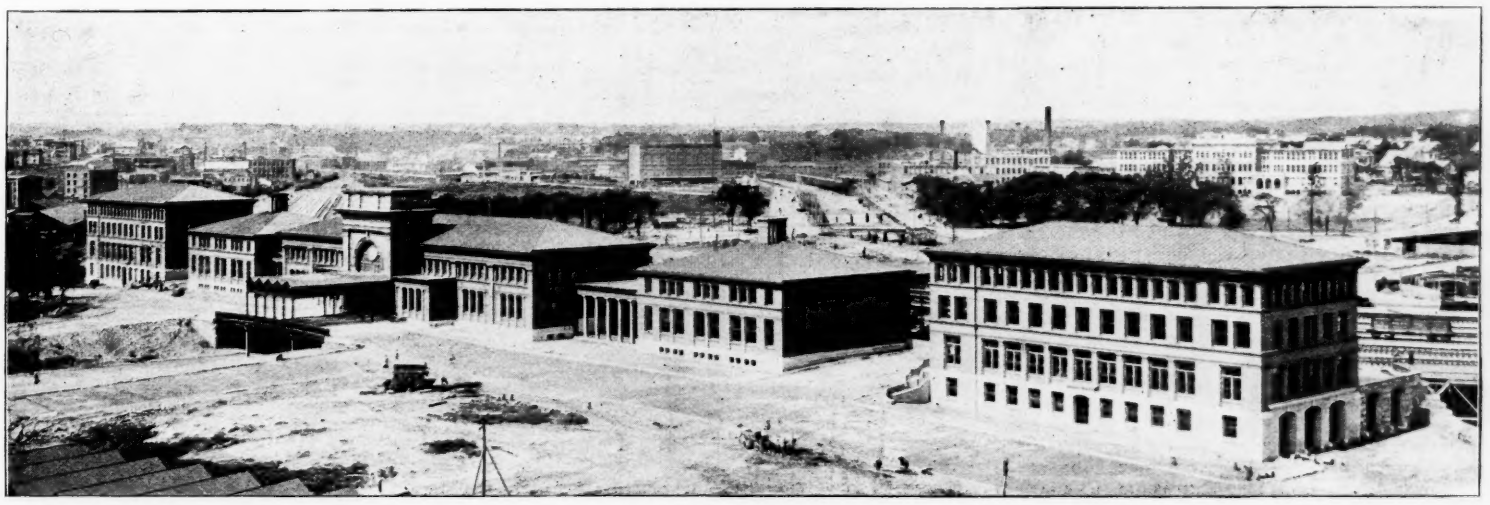
The buildings are now virtually completed, only a few of the comparatively minor items, such as hanging the chandeliers and placing electric lights, remaining to be done. A little track and platform work is yet to be done, but it is confidently expected to occupy the new buildings before Nov. 1, 1897.

At the extreme ends of the view the track approaches from either direction are distinctly shown. Provision is made abreast of the station for six through tracks and 12 stubs, which should be ample for the situation for a number of years ahead. By conversion of several of the stub tracks into through tracks, if occasion shall demand, 20 years hence a great increase in train service can then be provided.

Some of the more general features of the view are worthy of attention, notably the Woonasquatucket River, the principal stream which emptied into the former cove, a shallow circular body of tidal water, within the former limits of which these important railroad improvements are chiefly located. Some of the manufacturing plants in this busy valley can be distinguished in the view. The new State Normal School completed within the past year is also shown.

The streets and courts in front of the new station buildings are all paved with Trinidad asphalt on concrete base. The sidewalks are of granolithic work of Portland cement concrete.

The general and detailed plans of all the arrangements at this station were made by Mr. E. P. Dawley, M. Am. Soc. C. E., Division Engineer of the New York, New Haven & Hartford, and Mr. George B. Francis, M. Am. Soc. C. E., now Resident Engineer of the Boston Terminal Co. The architects of the station are Messrs. Stone, Carpenter & Willson, of Providence, R. I.



The Providence Station of the New York, New Haven & Hartford Railroad.

Helical versus Elliptical Driving Springs.

BY EDWARD GRAFSTROM.

It is the practice on many railroads to have all accidents or failures on the road reported to the Superintendent of Motive Power or the Chief Mechanical Officer, so that a repetition of those which can be traced to weakness of construction or faulty design may be guarded against if their frequency should warrant a change. The writer has for several years compiled a summary of all such incidents upon the road with which he is connected, and with the exception of such common mishaps as cut driving boxes or leaky flues, there has been no part of the locomotive which has given more frequently repeated trouble than the driving springs. Engines just leaving the shop would come back next day with one or more broken spring leaves, and many engines would be reported several times a month. The roadbed over which these engines run is one of the best in the country, and although the enforced retrenchment of the last few years may have aggravated the evil, there was still reason to believe that something was radically wrong with the general design of the spring arrangement of the engines most affected with the trouble.

Almost a year ago the writer was charged by the Superintendent of Motive Power to look into the matter, and to suggest changes that might be advisable. In looking over the summaries of locomotive failures for several years back, it was then found that the most frequent trouble of this nature existed with the heavy consolidation engines, which constituted the principal freight power of the road, and the first attention was therefore paid to this class of engines.

When the late Mr. J. B. Collin of the Pennsylvania Railroad designed the first consolidation engine* for that railroad he endeavored to equalize its weight in a manner based on the principle of equalizing then and now in vogue on the American type of engine. It is simple enough to distribute the weight of an engine equally on two pairs of drivers, where the centers of the two equalizers form the base of a tripod with the center of the truck, but with the introduction of the 10-wheel engines complications arose, and still more so with the consolidation type, where the weight had to be distributed between four pairs of drivers. As long as these engines were built of a comparatively light design the correct distribution of weight was of minor importance, but as the engines grew into their present proportions the faulty balance was multiplied, until to-day it is rare to find, even upon the foremost roads, a consolidation engine which has not one pair of drivers loaded greatly in excess of the pair that carries the minimum load.

As long as the boiler and the frames are elastic bodies yielding and deflecting between their supports, the writer cannot see how it could be otherwise, or how it could be possible, except by chance or by the closest calculations based on data still undefined, to produce an even distribution of weight by means of a system of balance levers.

After a careful survey of the various conditions regulating the subject under consideration, the writer finally arrived at the conclusion that it would be better and more natural to abandon the use of equalizing levers altogether and to transmit the weight of the engine directly through the medium of interposed springs to as many points of support that were offered, or in other words to repose upon each driving box an equal share of the total weight of the engine, and to transmit to the truck the difference between the loads upon the two rear and the two front pairs of drivers, in proportion to their distance from the center of gravity of the engine. The first intention was to place on each driving box a semi-elliptical spring, and to connect its ends with the

* Our understanding is that the *first* "consolidation" locomotive was built in 1866 by the Baldwins from the designs of Mr. Alexander Mitchell, of the Lehigh Valley.—EDITOR.

frames by means of spring hangers, each spring to be proportioned according to the weight on the driver upon whose box it rested. But at this juncture the writer hit upon the old plan of using helical springs in place of elliptical. By locating a balance lever on each box instead of an elliptical spring, and suspending from its ends the weight of the frame through the medium of spring hangers bearing upon helical springs, it was thought that the same result could be produced as with elliptical springs at a greatly reduced cost.

The idea of using helical driving springs is not a new one by any means. To a limited extent they have been used on English locomotives, principally as supplementary springs to the elliptical ones, after the same style as is now common in truck constructions under passenger cars. Experiments in the same direction have also been made in this country, but the degree of success heretofore met with has not been encouraging. The writer remembers an old Grand Rapids & Indiana engine which was nicknamed "the ballast crusher," and also recalls Mr. J. W. Cloud's unsuccessful attempt with horizontally placed helical springs actuated by a system of bell cranks on a Pennsylvania engine.

It is certain that a helical spring can never be as uniform or accurate as a straight or elliptical one, but if properly calculated and arranged to the best advantage there is no reason why helical springs should not be suitable for many purposes now dependent on the more expensive elliptical ones. They have already largely supplanted the latter in tender and freight trucks, and that they have come to stay for these purposes is now beyond doubt.

These arguments and others were laid before the Superintendent of Motive Power, who readily acquiesced in the proposition to make a trial of the helical springs on the lines above described. The Master Mechanic of one of the divisions was accordingly asked to pick out the worst riding consolidation engine in his charge, in order to make the experiment most decisive. Engine 44, that was selected, was verily a ballast crusher, and hardly a week had gone by without having a few broken spring leaves to replace on it. Besides, instead of having the weight evenly distributed between the drivers, as is the purpose with the equalized spring rigging, the engine was badly out of balance, as will be seen from the diagram below, which shows the original arrangement of springs and levers common on this class of engine. The weight on each pair of drivers and upon the pony truck is also given on the diagram and shows that there was a difference of 11,721 lbs. between the heaviest and the lightest load carried on an axle. Yet these axles all have the same size journals, and as a result the uneven journal wear as well as tire wear had long been a source of much annoyance.

After the engine had been shopped for repairs the center of gravity was carefully calculated, and the weight properly belonging to each axle according to its distance from the center of gravity was determined, after which the fulcrum of the truck lever was moved so that the truck would carry as much weight as was necessary to balance the equalizer over the front axle.

The diagram below shows the new arrangement of the springs. The engine was turned out of the shop in January, and when it was weighed it was found that the actual weights upon each pair of drivers corresponded closely with the calculations.

It should here be stated that it was not, and never should be, the aim to transmit the same amount of weight through each driving wheel to the point where it rests on the rail. The desire should, instead, be to produce the same pressure on every square inch of journal-bearing surface upon which the engine rests. If, as in this case, the driving journals are all of the same size, they should carry the same weight, and it follows that the pressure of the main wheel against the rail should be more in proportion, as that wheel is heavier than the others on account of carrying the extra weight of the main rod and the counterbalance necessary for it, as well as the eccentrics. In the case of this engine, the third wheel is the main wheel, and the second wheel is of the same pattern and carries also more counterweight and a heavier connecting rod than the first and fourth wheels; hence the figures in the diagram, which show the weight of each driver upon the rail, do not give the actual weight on each journal, which is in reality almost the same for all four pairs of wheels.

It will be noticed from a comparison of the diagrams that the weight of the engine was reduced 246 lbs. through the change, which is accounted for by the difference in the weight of the old and the new springs and levers, and by the omission of equalizing stands.

Since the engine was turned out of the shop in January the springs as well as the driving boxes have been subjected to careful periodical inspection. These springs have carried up well and the journals and driving boxes show a remarkably even wear, nor has there yet been a single instance of a hot box, which formerly was such a common source of trouble with this engine. No repairs have as yet been necessary to any of the parts affected by the change.

In regard to the riding of the engine with the new spring rigging much could be said. The writer has before him the reports of all the enginemen who have handled the engine since the change. They vary greatly in their opinions, as such reports will, some stating that it is the best riding engine of its class, while others simply say that "she rides smoother than before she got the coil springs." To judge from his own experience, the writer thinks that there is no doubt but that the engine rides far better than formerly, although at high speed there is as much jolting as ever; but this is most likely due to the counterbalance being designed for a moderate speed, and may be noticed on every freight engine racing down a grade or a long stretch of level track.

The writer does not mean to say that the improved riding of the engine is due to the use of helical springs. On the contrary, he feels certain that the substitution of judiciously arranged non-equalizing elliptical springs in the place of the faulty design formerly in use on the engine would have produced still better results. But by treating each bearing point independently, the use of helical springs is made possible in a simple manner, and if carefully proportioned in relation to their load, it shows that they can be made to do the work in a satisfactory manner.

The engine has not yet been in service long enough since the change to definitely settle the question of preference with regard to the two styles of spring rigging, but the Master Mechanic in charge thinks it would be economy to alter all engines of this class in a similar manner as they go through the shops for repairs. The economical feature of the arrangement is well worthy of attention, as the helical driving springs under this engine cost only about 90 cents each, while the elliptical ones formerly used ran up to $7 or $8 each. This difference in price, in connection with the frequency of broken leaves in the elliptical springs and the disappearance of excessive wear of the formerly overloaded driving boxes, is worth consideration.

The cost of labor and new material for making the change on engine No. 44 was found to be less than the yearly cost of keeping in repair the elliptical springs formerly used.

It is hoped that experiments in the same line will be made by other railroads, and the results made public.

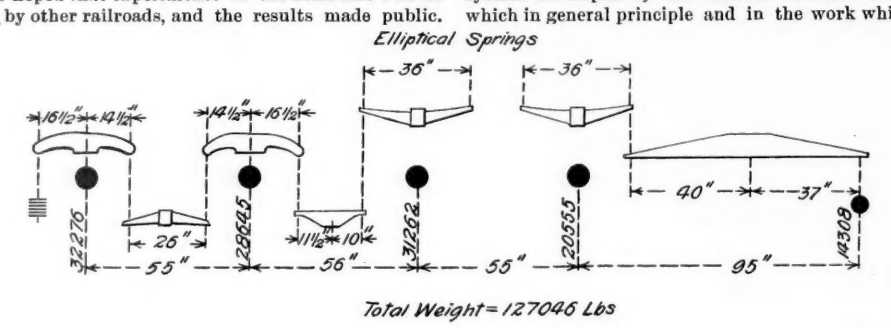


Diagram of Spring Rigging for a Consolidation Engine.

In the meantime it is probable that a couple of other engines on the same road and of the same class as the one above referred to will soon be changed in a similar manner so as to corroborate the results already obtained.

Lord Kelvin at the General Electric Works.

Lord Kelvin has evidently had what the Yankees call a "good time," on his visit to the United States and Canada. Although he is 73 years old, he has great intellectual and physical vigor, and Li Hung Chang is the only man who ever struck our shores who can ask as many questions in a day as Lord Kelvin. There is this great difference, that Lord Kelvin's curiosity never degenerates into impertinent personality, as, we regret to say, Li Hung Chang's often did.

Lord Kelvin came over primarily to attend the meeting of the British Association at Toronto, but before that meeting he visited Niagara Falls, where, of course, he saw with great interest the electric power plant, with the early studies for which he had much to do. He was chairman of the International Niagara Falls Commission. After the Toronto meeting he went to Vancouver by the Canadian Pacific, stopping at Winnipeg on the way out. He came back by the Northern Pacific and visited Yellowstone Park. At Chicago he was taken in charge by Mr. Thomson, President of the Pennsylvania Railroad Company, and Mr. Ely, Chief of Motive Power.

On the way east from Chicago Lord Kelvin visited Mr. Westinghouse and spent a day in the works of the Westinghouse Electric Co., the Westinghouse Machine Co. and the Air Brake Company, where he was greatly interested in the gas engine and the air brake as now developed and the recent progress made at electrical works.

Last Friday, Sept. 24, Lord and Lady Kelvin and a ismall party went to Schenectady to see the works of the General Electric Company. Here they were met by several of the officers of the company and by a number of gentlemen who had been invited to be present on the occasion and some two hours and a half were spent in going through the works, under the immediate charge of Professor Thomson and Mr. Rice, Third Vice-President of the General Electric Company.

In the machine shop and shipping department were shown machines from those of the capacity of 15 or 20 16-c. p. lamps to those built to supply current for 30,000 lamps. Seven 1,500-H. P. railroad generators were building for the Fourth and Sixth avenue lines of the Metropolitan Traction Co., and two 2,000-H. P. generators for Boston. Two 1,000-H. P. three-phase generators for the Lachine Rapids plant were shown under test; also the 1,250-H. P., 20,000-volt transformers for Niagara Falls and Buffalo, and five 700-H. P. rotary converters for St. Anthony Falls.

In the building devoted to armature winding and to making armature coils, Lord Kelvin saw examples of the recently developed revolving field alternators, dynamos with revolving fields and stationary armatures, a form adopted to admit insulation for high voltages, eliminating collector rings and moving contacts.

In another building Lord Kelvin saw Professor Thomson's magnetic blow-out. A current of 1,000 amperes at 500 volts was passed through an automatic circuit breaker. To show the effect on a blown fuse the magnetic fuse box was brought into use under the same test. The blown fuse withdrawn showed a very small amount of metal melted as the arc was created and extinguished.

An interesting experiment in high voltage currents was then made by Mr. C. P. Steinmetz. An arc was sprung between two metallic points, some 15 in. apart, with the current at a pressure of 180,000 to 200,000 volts, and drawn out to a length of about 5 ft., until it could no longer hold.

The party then examined the new surface contract system developed by the General Electric Company, which in general principle and in the work which it is designed to do resembles closely the Wheless system modified and developed by Westinghouse.

The electric brake for electric cars was shown on a car of the Schenectady Street Railway. This brake, which has several times been described in the *Railroad Gazette*, consists of two discs, one of which contains a coil of wire. When the controller handle is thrown from the running to the braking position, and no current is flowing from the controller, the motors become dynamos which turn their current into the coil of that one of the discs which is attached to the motor. It then becomes a powerful electro-magnet, and the discs are brought into contact. When the wheels stop, the armatures of the motors also stop, the discs separate, the wheels begin to revolve again (if on a grade), and current is generated in the motors, and the disc with the coil becomes again a magnet, and the cycle is again begun.

Asked to express an opinion on his visit, Lord Kelvin said: "I am enjoying myself very much, and learning enormously. There are no shops in the world like these; they are among the wonders of America."

THE SPRAGUE UNIT SYSTEM—AN ACCELERATION TEST.

There was one interesting demonstration made at the General Electric Works which Lord Kelvin was unable to see for want of time; that was a train of four standard Chicago & South Side Elevated cars equipped with the Sprague unit system and run on a track laid alongside the Erie Canal. This system has been described recently in the *Railroad Gazette*, and, therefore, it is unnecessary to go into that part of the demonstration now. It is enough to say that it was most interesting. The four cars coupled up were accurately and readily controlled from the end of either one of the cars. Naturally the motorman would be on the front platform, but in this respect, each car by this system is made an independent motor car, so that it can take its place at the head of a train or can be run independently in switching and other operations. A compact vestibule arrangement has been designed which will be applied to the cars now equipping for the "Alley L" by which the

motorman can be as well protected as he wishes, and which leaves the platform free for passengers when it is not at the head of a train. One very pretty feature of the demonstration was the acceleration of the train of four cars with three cars cut out, two cars, and then one car out, and finally with all four cars cut in.

A special acceleration test was made with one car. This car was equipped with four 50-H. P. generators, one on each axle, thus making every wheel available for adhesion. The car itself weighed about 24 tons. The result of the acceleration test was as below:

Seconds elapsed.	Miles per hour.			
5	14	16	18	19
10	26	28	29	30
15	31	34	34	35
20	35	38	37½	38
25	37½	40	39½	40½
30	39½	41	41	....

In this case the gear ratio was 1 to 54. This astonishing acceleration was secured with very little jerking; one found himself leaning over towards the rear of the car and continued to lean in that direction as the speed went up with such amazing swiftness. Such jerking as was felt can be entirely avoided by proper arrangement of the resistances and by careful manipulation. In a later issue we intend to discuss these accelerated tests with relation to other recorded accelerations.

Revolving Field Alternators.

An alternating-current dynamo is made up principally of two parts, the armature and the field; the alternating current being generated in the former, and the latter being energized by a direct current called the exciting current The exciting current magnetizes the field poles and the magnetism induces the alternating current in coils of the armature winding. Heretofore, the general practice has been to use a stationary field and to revolve the armature. In the revolving field alternators now being made by the General Electric Company this practice is reversed. The reason for using the stationary armature is, that it can be more readily insulated for very high voltages. The coils being stationary, and not subject to any mechanical strain, they can be protected and insulated by methods which would be impossible in a revolving structure. Besides this, it is unnecessary for the current to pass through any collector rings or other moving contacts, the only moving contact in the machine being the small collector rings which are used for delivering low-tension direct current to the revolving field. This field device is of extremely simple and strong construction. The coils instead of being made of wire are made of ribbon copper wound on edge, each coil being composed of a single spiral of this ribbon.

In the long-distant transmission work, which is now of very great importance, it is highly desirable that dynamos be wound for the same voltage which is used on the transmission lines, since the use of step-up transormers can thus be avoided. The General Electric Company is now building dynamos to deliver current at pressures as high as 12,000 and 15,000 volts. Machines are now in their shops the insulation wires of which are being tested at 25,000 volts. An example of these high voltage machines is the 1,000 KW. three-phase alternator which has just been built for the Brooklyn Edison Company. The largest machine of revolving field type which the company has produced was shipped from the works last week to the Edison Electric Illuminating Company of Brooklyn. This machine is of 2,000 KW. capacity; its diameter across the lower armature frame casting is 25 ft.; its total weight is 163,000 lbs., and is built to be run at a speed of 75 revolutions per minute. The reason for its great size in proportion to its capacity is that it runs at a low speed, being directly coupled to the shaft of an engine.

A Large Cast-Steel Gear Wheel.

The Sargent Company, Chicago, has recently cast a large steel gear wheel for the Western Tin Plate Co.'s mills, at Joliet, Ill., replacing a similar wheel of cast iron, which broke on several occasions, causing serious delay. This wheel is shown by the accompanying engravings, Figs. 1 and 2, made from photograph, and Fig. 3 made from a line drawing.

This gear runs at speeds varying from 35 to 40 revolutions per minute, drives four stands of sheet rolls each 24 in. in diameter, and transmits from 600 to 800 H. P. We are in receipt of a letter from the Tin Plate Co. stating that the new gear is working very satisfactorily, and that no trouble has been experienced since the steel gear was put in place.

By reference to Fig. 3 it will be seen that this wheel is cast in two parts and bolted together. It is 14 ft. ¾ in. in diameter over the top of the teeth, the pitch diameter is 13 ft. 9¾ in., and there are 104 teeth 3½ in. high with a circular pitch of 5 in. The face of the gear is 20¼ in. wide, while the teeth measure but 16 in., thus leaving 1¾ in. of metal on each side below the pitch line, which greatly strengthens the teeth. The wheel has 8 arms of an I section, the flange and webs of the arms being 1¾ in. thick, while the width of the flange near the hub is 9 in. tapering to 8 in. near the rim. The wheel weighs 28,175 lbs.

The machine work was done by the Bates Iron Works, Joliet, Ill., and consisted of fitting the two halves together, boring the hub, cutting the key way and turning up the face of the rim outside the teeth. No machine work of any consequence was done on the teeth proper.

The results of the chemical analysis of the steel from which this wheel was made are as follows:

Carbon	.30 per cent.
Manganese	.65 " "
Silicon	.30 " "
Sulphur	.03 " "
Phosphorus	.03 " "

The physical characteristics of the material shown by a pulling test are as follows:

Ultimate tensile strength	71,300 lbs. per square inch
Elongation in 2 in.	35 per cent.
Reduction of area	42 per cent.

Even those who have only a general knowledge of the manufacture of cast steel parts will be able to appreciate the difficulties attending the making of such a casting as the one illustrated. That it is possible to successfully make such castings shows what rapid improvement is being made in this branch of the steel industry.

Papers at the New York Street Railway Association.

Last week we gave a report of the recent meeting of the Street Railway Association of the State of New York, held at Niagara Falls Sept. 14 to 16, together with abstracts of some of the papers presented. We give below briefly some extracts from many papers not previously published in our columns; in doing this it has been our aim to bring out the main points discussed by the writers on the various subjects.

THE PREVENTION OF ACCIDENTS.

By H. T. Cooper, Schenectady, N. Y.

From an examination of the causes of accidents on street railroads and from my own experience in the matter of handling employes, I have been led to practice the belief that in the *personal* element lies most of the danger from accidents, and also the means of their prevention, if properly managed. I do not mean to say that the remedy lies entirely with the human element unassisted, for no matter how good the workman is he must have good tools before his work can be his best. We must supplement our human nature with the most perfect "safety appliances"—moral, mental and material—if we wish to obtain anything approaching entire immunity from accidents for which we are really responsible, or are held responsible.

By the "personal element" I mean the whole personnel of the company; not only the motormen and conductors, not only the starters and switchmen, not only the inspectors and repairers, but every one connected with the company, the foremen, superintendents, managers, clerks, counsel, executive officers, board of directors, and I do not know but what I would include the stock and bondholders. That may seem far-fetched, but let us look at it. If a company inaugurates or perpetuates a policy by which it hires the cheapest kind of men, regardless of the duties that they are to be made to perform, if it pays them only what it is compelled to by law, by trades unions or by the competition of other labor employers: if it works these men longer than human beings can endure and remain well balanced; if it works them in unnecessarily uncomfortable, exposed or dangerous situations; if it gives them difficult or delicate duties to fulfill, and inefficient means or apparatus to perform them with; if it shirks the use of improved safety appliances or methods, and only installs them when the loss from accidents, the force of public opinion or the hand of legal authority forces it to; if it treats its employees merely as a minor and necessary adjunct of its machinery and apparatus; if it does any, or most, or all of these things, do you not suppose that the personal element will be a danger element?

On the other hand, let a company hire men of habits and intelligence suitable to the duties they will be required to perform; let it take care of them in such a manner that they will at all times be in condition to exercise their faculties of mind and body to the fullest advantage of their duties; let it give them the proper means and facilities for performing those duties in a perfect manner; let it give them every *tried*, so-called "safety appliance" before adverse circumstances force it to; and I will guarantee that the personal element will be a *safety* element.

Why? Because the men are better men? Not all that. Because they are more comfortable in the performance of their duties? Not all that. Because they feel more secure in their position and the fulfillment of these duties? Not all that, either. While all these points have a bearing (and a great one) on the safety element, the real reason, the soul of the whole matter, lies in the fact that one company does not seem to *care* for immunity from accidents if that immunity causes more trouble and expense, the other proves that it does not *want* accidents at *any* cost.

I have spoken before of equipping with safety appliances. Now, what are safety appliances? Do they consist simply of the fenders, brakes, switches, signals, etc.? Do they not consist of much more than these? Turn the thing around and look at it! Is not every single article we own and operate a "danger appliance"? Is there anything from the cap of our power station chimney to the bottom of our pole holes that is not a menace to safety if not of the proper material, properly made and properly operated? Is there a single article in our powerhouses, car barns, repair shops, lines, tracks or cars that has not at some time or in some place killed, maimed or injured somebody?

Put up a big blackboard in every department—put one in the directors' room and in the officers' offices—and when a safety rule is being slighted, when it is being overstrained, when it has been changed or repaired, put up a big "Notice" on the board and call attention to it.

You can go farther than this; if you are about to have something extra in traffic or in operating; if your city is to have some event that will greatly increase your traffic; if the winter season is coming on with its attendant snow, sleet and ice; if the summer season is approaching with its increase in traffic—seize the opportunity to put a little blood into some of the anæmic rules, give them an outing on the blackboard; it will do them both good.

In fact, it is wiser to go even farther than this. Make it a point to see that the safety rules and orders *all* get an airing once a season or so.

Ninety-nine out of every hundred accidents which we have had to father would not have occurred had not some one failed to perform his safety duty. We may spend any amount of money on improved sand-boxes, controllers, switches, signals and the thousand and one new safety devices now being exploited and the personal element can render them nugatory at the very minute we need them. We can brand our motormen as butchers and the public as blind idiots by putting a "contraption" of steel springs, canvas and tarred rope on the front end of our cars and danger will walk quietly in at the rear end in the shape of some small neglect of safety committed long ago at the other end of the line.

The question is: How can we change this personal "danger element" into a personal "safety element"? The answer is, With good men, suitable men, well paid, well cared for, well equipped, well watched, well disciplined and saturated with what should be the instinct of every member of the company, from the president to the track greaser—the idea of safety as a first thought in every duty that is performed.

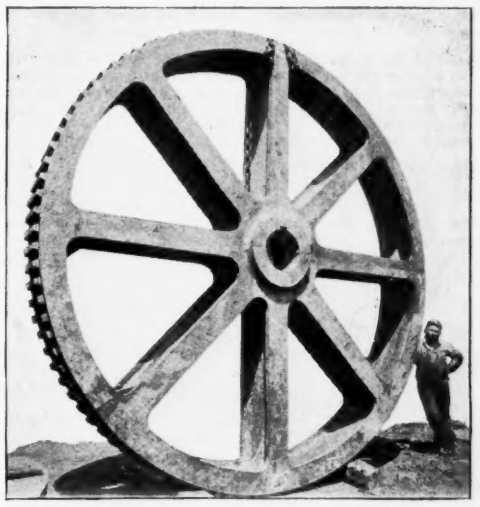


Fig. 1.—Large Cast Steel Gear Wheel, Made by the Sargent Company, Chicago.

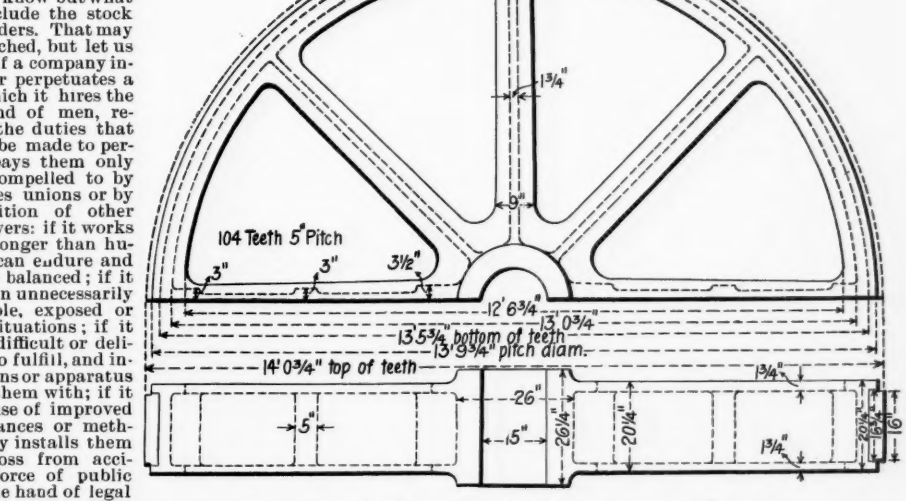


Fig. 3.—Cast Steel Gear Wheel, Made by the Sargent Company.

Fig. 2.—Cast Steel Gear Wheel

THE ADVANTAGES OF A CAR MILEAGE RECORD.

By T. J. Nicholl, Rochester, N Y.

With the object in view of having, as near as possible, an absolutely correct system of computing its mileage, the Rochester Railway Co. has spared no effort, with the result that the system now in force works to perfection and answers our requirements in every detail. We operate 78 73 miles of track in the city, covering an area of about 18 square miles. Some of our routes are quite intricate, and on part of them we have as many as six turning points, where we can turn part of our cars, as the traffic on the balance of the line may not warrant the same service as nearer the city. In some instances our cars run on several different lines during one day. Our average daily mileage is between 13,000 and 14,000 miles, or about 5,000,000 miles annually.

In the first place, our engineers made a very careful survey of each line, and mapped same out to the scale of 400 ft. to 1 in. These maps show all switches, crossovers, junctions, cross streets, etc., and the distances are given from commencement of the line to all points where it is possible to turn. From these maps we have figured tables for any specified number of trips or half-trips in either direction on each route.

Each motorman makes report of the number of trips made by his car daily on a card which answers a threefold purpose. In addition to giving the number of trips made, it answers as a time card and also as a trouble report. Any motorman taking out a car makes out one of these cards which he hands to his relief, and the man pulling the car into the barn drops this card into a box provided for the purpose. The night foreman has access to this box, and from the reports finds out all repairs necessary to be made, and anything he is unable to complete he reports to the day foreman.

Every motorman is advised of the importance of having his trips, time, etc., correct, and is required to account for any trips lost and also to report any defect which he may notice about his car, and if he fails to do so is held strictly accountable.

The trip cards are checked with the starter's report, so that no cards can be left out; also the time of leaving barn and pulling in must agree, and there is no chance of anyone getting more time than is actually put in, as the time a man leaves the car must agree with the time his relief takes it.

From these trip cards the mileage is figued by routes, the mileage for each car being put down separately on the slip.

The individual car mileage is then posted daily to the credit of each car in a book provided for the purpose, and the amounts are carried forward monthly, so that when we want the mileage of any article we have only to subtract the total mileage at the time the same was put into service from the total mileage made by the car on which it is used, at time it comes out.

The route mileage is posted up daily in a book provided for this purpose, and in this way we get the mileage of each for the month or year; the earnings are also shown on this book.

A daily report is made for the manager, which shows the mileage and earnings on each line, also weather, etc. It also gives the corresponding figures for the previous year.

A monthly mileage, earnings and passenger report is also rendered. This furnishes a comparison between the current and previous year for each line. It shows the mileage, total earnings, earnings per car-mile, passengers and transfers. It also snows the increase or decrease, as the case may be, and affords an excellent guide in regard to service that should be provided for each line, and we can thus keep each individual route up to a standard. From the figures on this sheet many valuable statistics can be deduced, especially in reference to traffic, etc

On our monthly mileage statement we figure all the various operating expenses per car-mile, showing also the corresponding figures for the previous year, and thus we have a very good comparison of results. We also keep records of the cost of repairs per mile on the various equipments in use; also of the life of car wheels and other parts of an equipment. In short, from the mileage we obtain most interesting statistics in almost every branch of the business.

TRACK BONDING — HOW CAN WE OBTAIN THE BEST RESULTS?

By H. C. Newton, Syracuse, N. Y.

The true importance of rail bonding, that is, the really significant factor it becomes in determining the cost of operation of the road, is but indirectly realized, I am inclined to think, by the large majority of railroad men.

There is an old formula in elementary electricity, which, if kept more constantly in mind by street railroad economists, would explain some of the obvious faults in the ground return and the extravagant fuel records which have appeared in some first-class street railroad power-stations. This formula is that for the energy developed in an electrical circuit. It is expressed variously in terms of the current and voltage of the circuit as C. E., and in terms of the resistance and voltage as E. R. Either of these expressions may be used to advantage in calculating the magnitude of leaks, but they are all generally overlooked by the so-called practical man when reaching his conclusions.

An equipment consisting of a first-class 600-volt voltmeter and a 250-ampere ammeter with a motor car and an accurate knowledge of the voltage carried at the station, is all the apparatus and data necessary to determine the quantities involved and to obtain with fair approximation the loss which is going on in the circuit outside of the motors and the generators at the station.

The first factor in the determination, viz, the loss in the trolley line, is, to some extent, a known quantity. You have already, or can figure easily, the resistance of the trolley and the feed, and by assuming a certain volume of current, the amount of energy lost—varying of course with the power consumed—is at once obtained. The second factor must be obtained by the subtraction of the determined factor from the total loss. For this total loss your instruments come in play, and it is only by a series of readings on them with the car in motion on the road, and the determination thereby of the watts spent in running the motors, that a satisfactory result can be obtained. The difference between the voltage, as shown on the voltmeter, and the volts shown on the voltmeter at the station, multiplied by the current, gives us this result. The difference between this result and the loss obtained for the trolley and trolley feed lines by calculation should give us the loss in the track of the power employed for that individual car. The result is generally astonishing, especially if the traffic is heavy, and there are cities not a thousand miles from here where the sun of the horse car rail is not yet set, where reading will snow 50 and 60 per cent. loss at certain times. To obtain the best results a rail joint should have an equal or better, a greater current carrying capacity than the body of the rail itself.

A DECADE OF ELECTRIC RAILROAD DEVELOPMENT.

By William J. Clark.

During the last nine years the increase in the mileage of electric roads in New York state has been approximately 15,000 per cent., and the street railroad mileage of the United States has increased over 156 per cent. during the same period. During the same interval the mileage of American steam railroads has increased but 31 per cent. This fact in itself would seem to demonstrate that the American street railroad men have grasped the possibilities of building up transportation in a more thorough manner than have their brethern of the steam railroad fraternity. But for a more immediate illustration of the comparative growth, as well as some other startling facts, let us come nearer home and introduce a comparative statement compiled from the reports of the Railroad Commissioners of the state of New York for the years 1887 and 1896, covering street railroads, surface steam railroads and steam elevated systems.

It may be said that all of the wonderful progress above shown by the street railroad interests cannot be directly attributable to electricity, as an introduction of cable in New York City is, to a certain extent, responsible for such progress, yet as the effect of the cable traction on our general proposition is so similar to that of electricity, and as New York is so fast becoming an electric traction city, it is considered unnecessary to go into the refinement of sub-division of mechanical traction methods in their effect, for both tend to demonstrate the theory which we have advanced, and show that as great benefits have been conferred upon the community served as can be done consistently with the financial investments, in the corporations, and, unquestionably to a certain extent, show also that in development which discounts the future, resulting inthe public benefit referred to, the interest of stockholders may not have been as thoroughly promoted as if a less liberal policy had been pursued. Yet some of the figures, unless further explained, might be grasped by those who advocate municipal ownership, reduced rates of fare and additional burdens upon street railroad corporations, as demonstrating the theories of increased earnings, reduced operating expenses and other things, which they consider sufficient reasons for advocating the practical confiscation of vested rights of the greatest benefactors, in a corporate way, communities have ever had. True, street railroad earnings have increased and operating expenses have decreased, and many other advantages have come to the street railroad companies through the introduction of electricity, but for every dollar of actual net return which the investor in street railroad securities has received in the Empire State, we do not hesitate to say that the municipalities and the general public have received at least $10 direct benefit, and that the general public has thus profited far more greatly from the advantages of rapid transit than have the investors who produced it.

Let us consider some of the figures quoted. In 1896 the operating street railroads of New York state paid $1,164,820.40 in direct taxes--a good sized percentage in itself on gross receipts, as will be noted. This, let it be remembered, does not include certain additional amounts paid by the holders of securities of lesser and other companies, or certain percentage contributions which, if calculated together, would compare favorably in amount with the demands for percentage payments made by some of the loudest advocates of such theories. A little calculation will also show that the street railroad companies maintain about 9,000,000 sq. yds. of street surface, or paving, the practical equivalent of maintaining a street 250 miles long; yet, as is well known, with the now rare exception of horse roads, the street railroads of New York state do not wear the surface of the street at all, but their tracks unquestionably save much wear from vehicle travel, as compared to the ordinary roadway, which must be maintained by the municipality. Remember, these burdens are imposed for the privilege of running the "poor man's carriage."

From a calculation based upon the census returns of 1890, the average tax rates of the various cities in New York state, the owner of an ordinary carriage or vehicle pays, proportionately, only about one-sixth as much for his privilege of going where he will with the same and wearing out the pavements at pleasure.

One of the results, for which I presume electricity must be to a certain extent held responsible, owing to the expectation of greater returns and other excuses made by municipal officials for unreasonable assessment, is inequality of taxation. To illustrate this point, we interject here a somewhat surprising calculation, compiled from the Railroad Commissioners' report for 1896, which would seem to demonstrate that valuation or property, earnings, passengers carried, car miles run of no other intelligent basis of assessment of taxation on street railways in this state has been followed, and that certain hardships have resulted, is, we think, clearly apparent.

Looking over our figures, we might be met with that oft-repeated statement that street railroads have been over-capitalized. To this charge we cannot but reply that the promoters of some of the street railroads have not been entirely guiltless of the sin of over-capitalization to a certain extent, yet far less than is ordinarily

COMPARATIVE STATISTICS ON ALL OPERATING RAILROAD COMPANIES, NEW YORK STATE, 1887-1896.

	Surface Steam Roads.				Elevated Steam Roads.				Street Railroads.			
	1887.	1896.	Inc. or Dec.	Per cent. Inc. or Dec.	1887.	1896.	Inc. or Dec.	Per cent Inc. or Dec.	1887.	1896.	Inc. or Dec.	Per cent. Inc. or Dec.
Gross earnings, freight and passenger traffic	$143,724,490	$210,089,592	$66,365,102	46.09	$8,691,439	$11,896,461	$3,205,021	36.87	$17,966,518	$28,808,898	$10,842,380	60.38
Operating expense, freight and passenger traffic	92,439,974	146,063,417	53,523,442	57.98	4,962,148	7,154,581	2,192,332	44 20	13,291,855	17,848,759	4,556,903	34,31
Net earnings from operation	51,284,516	64,026,174	12,741,658	24 87	3,729,290	4,741,880	1 012,589	27.18	4,674,662	10,960,139	6,285,486	134.6
Income from other sources	5 453,671	7,132,210	1,673,539	30,80	87,659	247,119	159,460	182 00	320,933	1,428,192	1,108,259	346.4
Gross income from all sources	56,738,187	71,158,385	14,420,198	25.90	3,816,949	4,989,000	1,172,050	30.72	4,996,596	12,388,332	7,391,736	148.1
Interest	17,469,522	23,052,019	5,582,497	32 00	1,781,442	3,104,125	1,322,683	74.24	1,565,711	3,351,770	1,786,058	114.15
Rentals of leased lines	14,702,117	20,710,892	6,008,775	40.80	20,000	68,225	48,225	241.1	342,318	3,833,211	3,490,893	102.0
Taxes	5,018 907	7,781.389	2,762,482	55.01	478,294	895,830	417,535	87.40	829,192	1,164,820	335,627	40.4
Miscellaneous deductions from gross income	1,039,697	1,390,260	350,562	33.72					54,747	170,993	116,245	212.6
Total deductions from gross income	38 230,244	52,934,561	14,704,317	52 20	2,279,737	4,068,180	1,788,443	78.53	2,791,970	8,520,796	5,728 825	205.3
Net income from all sources	18,507.943	18.223,824	284,119	1 53 D.	1,537,212	920,819	616,393	40.1 D.	2,203,626	3,867,536	1,663,910	75.65
Dividends	10,207,885	14,567,454	4,349,568	42.12	1,560,000	1,800,000	240,000	15,38	1,415,397	3,379,953	1,964,556	113.95
Miscellaneous payments from net income	15,654	102,554	86,900	555.10					36,128	8,503	27,625	76 7 D.
Surplus	8,284,403	3,563,815	4,720,587	87 00 D.	22,787	879,180	856,393	376.5 D.	725,100	479,078	273,021	36.33 D.
Percentage operating expenses to gross receipts	64.42	69.52	5.1	7,92	57.08	60.14	3.06	5.36	73.98	61 96	12.02	16.26 D.
Percentage net income to capital stock	3.5	2.43	1 07	30.6 D.	4.79	1.91	2.88	60 13 D.	6.89	3.61	3.28	47.65 D.
Percentage dividends to capital stock	2.19	2.49	.3	13 7	4.9	3 73	1.17	23,90 D.	4.5	5.08	.58	12.89
Percentage gross income to cost road and equipment	4.81	5.39	5 8	12.07	7.96	5.02	2 94	36 93 D.	8.58	4 8	3.78	44.05 D.
Total passengers carried	94,272,116	179,315,449	83,043,333	90.25	172,358,082	235,330,148	62,972,066	36.53	361,543,930	672,498,760	310,954,830	86.1
Passenger earnings per mile traveled*	2.36 cts.	2.22 cts.	0.14 cts.	5.94 D.	5.04 cts.	4.05 cts.	0 01 cts	.2	4.97 cts.	4 28 cts.	0 69 cts.	13.90 D.
Passenger expense per mile traveled*	1 51	1.64	0.13	8 61	2 88	3.04	0 16	5.56	3 68	2.65	1.03	28.00 D.
Passenger profits per mile traveled*	0.85	0.58	0 27	31.73 D.	2.16	2 01	0 15	6 94 D.	1.29	1.63	0 34	26.35
Miles of track in New York state	12 248 44	14,401.25	2,152.81	17.57	109.81	167,743	57,938	52 75	908.91	1,736 99	828.08	91.15
Gross earnings from operation per mile of road operated	$12,090 03	$13,787.21	$1,697.18	14.04	$79,140 69	$70,921.73	$8,218.96	10 38 D	$19,765 12	$16,591 25	$3,173 87	18.07 D.
Operating expense per mile of road operated	7,776.00	9,585.47	1,809 47	23,32	45,103 60	42,652.00	2,450.80	5.45 D.	14,622.49	10,275,60	4,346.80	29.68 D.
Net earnings from operation per mile of road operated	4,314.03	4,201.74	112.29	2.61 D.	34,037.09	28,268.93	5,768.16	16.94 D.	5,142 63	6,325.85	1,183.02	23.05
Average number of employees for year	102,634	146,987	44,353	43.22	5,136	7,120	1,984	38.66	13,873	23,952	10,079	72.70
Combined net income of operating companies and dividends of leased companies, constituting entire net income of all roads	$22,122,931.74	$22,337,604.59	$214,662.85	.97	$1,537,212.47	$920,819.43	$616,393.04	40.1 D.	$2,226,974 29	$5,774,229 72	$3,547,255.43	159.3

*On Street and Elevated Railroads these figures are given "per passenger."

COMPARATIVE STATEMENT OF STREET RAILROADS IN THE UNITED STATES, JANUARY 1, 1888—JANUARY 1, 1897.

	1888	1897
Total number of operating companies	615	806
Number of street railroads operated by horses	566	167
Number of street railroads operated by cable	18	38
Number of street railroads operated by steam dummies, not including elevated	35	33
Number of street railroads operated by electricity	21	698
Mileage of horse car track	5,474	1,010
Mileage of cable track	217	515
Mileage of steam dummy track, not including elevated	216	145
Mileage of electric track	86	13,580
Total mileage of street car track	5,993	15,250
Number of horse cars	21.736	3,664
Number of cable cars; grip, 860; trail, 1,917	2,777	5,957
Number of steam dummies and cars; dummies, 165; cars, 258	423	318
Number of electric motor cars, 166; trail cars, 6	172	37,097
Total number of street cars, all descriptions	25,108	47,036
Percentage horse car track to total mileage	.914	.066
Percentage cable track to total mileage	.036	.034
Percentage dummy track to total mileage	.036	.009
Percentage electric track to total mileage	.014	.891
Percentage horse cars to tota number	.866	.078
Percentage cable cars to total number	.111	.127
Percentage dummy cars to total number	.017	.007
Percentage electric cars to total number	.006	.788
Average length horse car lines	9.67 miles	6.05 miles
Average length cable lines	12.06 miles	13.55 miles
Average length dummy lines	6.17 miles	4 39 miles
Average length electric lines	4.09 miles	13.02 miles
Largest street railroad (West End Company, Boston), operated by horses	212 miles	430 miles
Largest cable road (Chicago City Railway Co.)	26.25 miles	
Largest electric street railroad (Richmond Union Passenger Railway, 40 cars)	13 miles	Union Traction Co., Philadelphia.

supposed, We believe, however, that the aggregate amount of all such illegitimate financiering in connection with the street railroads of New York state, since the advent of mechanical traction, is not so great as the unintelligent and wasteful expenditure of public funds in one or two large cities of the United States for a fraction of this period, and we cheerfully invite the advocates of municipal ownership to devote some study to this feature. Where the money represented by the present investments has gone is in the legitimate purchase of underlying companies or companies antedating mechanical traction and inexpensive construction and equipment, which could be duplicated to-day at a much smaller figure. Some illustrations of this feature. In the early days of electric traction, when most of the construction and equipment was done in this state, girder rails cost more than double their present figure; electric car equipments from 250 to 400 per cent. more; car bodies from 25 to 35 per cent. more; power station equipment from 100 to 300 per cent. more. That prices have depreciated is not the fault of the railroad investors and managers, and surely does not affect the legitimacy of their investments.

We regret that time and space will not permit us to make an elaborate comparison of the wages paid street railroad employees here with those prevailing abroad, or to demonstrate at length that electric traction increases the labor account, although it produces economy in other directions. We would note, however, that according to the last report of the Glasgow Tramways—the model horse railroad system of the world and the ideal of municipal ownership—that the total wages aggate but 46 per cent. of the operating expenses, while on that model of electric street railroads, the Buffalo, N. Y., system, as shown by its report for 1896, over 77 per cent. of the entire operating expense is paid to labor, while this percentage holds practically good on all the street railroads of the state operated by mechanical traction.

Now, as to the most serious of all offenses that have been charged to mechanical traction, viz.: accidents. The daily press is constantly filled with references to the "Deadly Trolley," with occasional remarks concerning Mr. Vreeland's cars of "Juggernant," but what are the real facts concerning this very serious matter, and what are the comparative results between the present and the past on street railroads in this state, and how does the annual result compare on the street and steam railroads? According to the Railroad Commissioners' report of 1896, there were killed on the street railroads of New York state 13 passengers, 7 employees and 51 others, making a total of 71. This represents one for each 1,807,316 car miles run, or one for each 9,383,258 passenger carried. Against this number the surface steam railroads killed five passengers, 211 employees and 544 others, or a total of 760. This represents one for each 241,950 train miles run, or one for each 235,941 passengers carried. So it is safe to say on fatalities that our steam railroad friends are producing the same in the proportion of about eight to one as against the street railroads. In the same year the street railroads injured 197 passengers, 35 employees and 157 others, or a total of 389. This represents one for each 329,875 car miles run, or one for each 1,728,788 passengers carried. During the same period the steam railroads injured 174 passengers, 2,142 employees and 592 others, or a total of 2,908, running for each 63,233 train miles, or carrying 61,663. The total killed and injured on street car lines was 462, or one for each 277,752 car miles run, or one for each 1,442,016 passengers carried. The total killed and injured on the steam roads amounted to 3,668, or one for each 50,131 train miles, or one for each 48,886 passengers carried. From this comparison it will be seen that if the daily press devoted as much space comparatively to steam railroad accidents as to those on street railroads they would have room for nothing else in their columns and might require daily Sunday editions. In 1887 the street railroads of New York state killed one person for each 9,983,646 passengers carried, almost the same average as the present, as shown above. They injured one person for each 1,398,487 passengers carried, or proportionately 25 per cent. more than in 1896. This, we think, thoroughly demonstrates that mechanical traction is far safer than the horse car in every way. But another surprise: While, as shown, the percentage of accidents has been decreased, the natural inference would be that this improvement had occurred in connection with the passengers or employees, and that with increased speed must come greater danger to those upon the streets. Strange to say, however, the proportion of accidents between 1887 and 1896 to this class is 33⅓ per cent. less. It should be remembered in this connection also that the average speed of cars on the street railroads of New York state has more than doubled during the past 10 years.

Bridges over the St. Lawrence for the New York & Ottawa.

The New York & Ottawa, a railroad now building in northern New York and Ontario, has planned to cross the St. Lawrence from Cornwall, Ont., to a point near Hogansburg, N. Y. At the place where this crossing will be made the St. Lawrence is divided into two channels by Cornwall Island. The plan is to cross the south channel from the New York shore to the island by one bridge, then to cross the island on an embankment about three-quarters of a mile long, and finally the north channel and the Cornwall Canal by another bridge with a draw span at its Ontario end.

Fig. 1 shows the bridge over the south channel. It consists of three Pratt truss spans each measuring 368 ft. ½ in. center to center of end pins, and a plate girder approach span 60 ft. long at each end. The bridge will be 37 ft. 6 in. in the clear above high water. The trusses will be placed 22 ft. center to center, and the track stringers and plate girders will be spaced 8 ft. centers. The trusses will rest on wall plates 42 in. square.

Fig. 2 shows the bridge over the north channel of the river and the Cornwall Canal. This will be a cantilever bridge with anchor arms 210 ft. 6 in. long, composed of eight panels 26 ft. 3¾ in. each. The central span will be 420 ft. long, with overhanging arms 131 ft. 3 in. each, composed of five panels 26 ft. 3 in., the suspended part being 157 ft. 6 in. long, composed of six panels 26 ft. 3 in. each. The greatest depth of the cantilevers is 65 ft., while the least depth is 28 ft., and the distance between the trusses is 20 ft. On the Ontario shore, at the north end of this structure, there is a swing drawbridge 240 ft. long, center to center of end piers. One arm of this draw spans the Cornwall Canal. Each truss is 111 ft. 9 in. long and composed of four panels 27 ft. 11¼ in. each. The trusses are 28 ft. deep and spaced 17 ft. apart. The distance between the track stringers on both structures is 8 ft. and the vertical clearance is 21 ft. The floor of the bridge is level and the clearance above high water is 60 ft.

There is an approach span at the south end of this bridge made of plate girders 60 ft. long over all, spaced 8 ft. apart. The approach at the north, or Ontario, end of the bridge consists of a plate girder trestle, 282 ft. long. This is composed of seven panels 30 ft. each, alternately braced and open, and two others, one of which is 41.7 ft. and the other 30.3 ft. long. The sides of the braced towers have a batter of 1 to 6. The distance between the girders is 8 ft. About half of this viaduct adjoining the bridge is built on a vertical curve, the remainder having a grade of 0.6 per cent. The last 95 ft. of the structure is built on a 3 deg. curve to the left.

Both bridges are designed to carry a single-track railroad. The live loading is that given in Class E 35 Cooper's specifications of 1896. The superstructures are designed in accordance with the standard specifications of the Phœnix Bridge Co., the contractor for the bridges.

The superstructures will be carried on rock-faced ashlar masonry with Portland cement concrete backing. The river piers will rest on cribs filled with Portland cement concrete up to within 3 ft. of low-water mark. These piers will each have a bush-hammered nosing cut-water. The shore piers will rest on concrete footings placed in excavations dug 5 ft. below low water. The earth under these footings consists of hard compact clay and boulders. The pivot pier for the swing span over the Cornwall Canal will be built in a coffer dam.

The work of building the substructures is now well under way. Both abutments for the bridge across the south channel have been finished, and the masonry of piers 1 and 4 is being laid. The crib for pier 3 is finished and in position, and the crib for pier 4 is in course of construction. In order to place the cribs in the swift current in the channel, two Chinese anchors were dropped up-stream and each crib fastened to these by a 3-in. steel cable. Each crib was also suspended between two barges in order to prevent any lateral movement. Work is in progress on the shore piers for the bridge over the north channel. The material for the river piers of this bridge, which comes down on the Cornwall Canal, will be taken from the boats and carried out to the pier sites by a Lidgerwood cableway extending from the Ontario shore to the island. Messrs. Sooysmith & Co., sub-contractors under the Phœnix Bridge Co., are building the substructures.

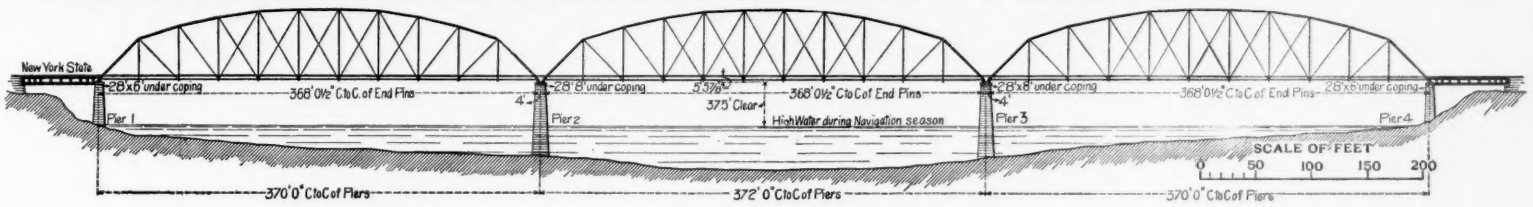


Fig. 1.—Bridge Over the South Channel of the St. Lawrence River—New York & Ottawa.

Train Accidents in the United States in August.

COLLISIONS.

REAR.

7th, on Lehigh Valley, near Coxton, Pa., a freight train ran into the rear of a preceding freight and the engine fell down a bank. A man in the caboose of the foremost train was badly injured.

9th, on Atchison, Topeka & Santa Fe, at Burlingame, Kan., the second section of passenger train No. 2 ran into the first section, which was standing at a water tank, badly damaging several cars. One fireman and 1 postal clerk were injured.

16th, on Georgia road, near Charleston, Ga., a freight train ran into the rear portion of a preceding freight which had become detached on an ascending grade, and the caboose and a car of coal were wrecked and burned up. The engineman and fireman were injured.

19th, on Wilkes Barre & Northern, near Dallas, Pa., a freight train ran into the rear of a preceding freight, damaging the engine and 2 cars. The Assistant Superintendent of the road and one brakeman were injured.

19th, on West Virginia & Pittsburgh, at Erbacon, W. Va., a special passenger train ran into the rear of a preceding freight, badly damaging several cars. The fireman was killed and the engineman and 2 officers of the road were injured.

21st, on Western Maryland, near Westminster, Md., a freight train ran into the rear of a preceding passenger train which had been unexpectedly stopped and 3 passenger cars were badly damaged. One passenger was injured.

25th, on Chicago Great Western, at Alta Vista, Ia., a passenger train standing at the station was run into at the rear by a following freight, and the engine and 2 passenger cars were badly damaged. One passenger was killed and several injured.

And 26 others on 20 roads, involving 3 passenger and 38 freight and other trains.

BUTTING.

4th, at Jamestown, N. Y., butting collision between passenger trains of the Jamestown & Lake Erie and the Dunkirk, Allegheny Valley & Pittsburgh. Three passengers were injured. It is said that one of the trains used the main track in the face of the other, without authority.

11th, on Southern Pacific, at Marysville, Cal., butting collision between a passenger train and a freight, badly damaging both engines. The engineman of the passenger train jumped off and was killed.

19th, on Lehigh Valley, near Honeoye Falls, N. Y., butting collision between a regular and an excursion passenger train, wrecking 2 passenger cars. Two trainmen and 5 passengers were injured. In both trains the engine was at the rear.

20th, on the eastern approach of the Merchants' Bridge, near Madison, Ill., butting collision between a freight train and a construction train, due to a misplaced switch. Three empty cars were knocked down a bank and 10 others, together with the engines, were wrecked. A tramp was killed and two others were injured.

24th, 3 a. m., on Pennsylvania road, at Gordonville, Pa., butting collision of freight trains, due, it is said, to the mistake of a signalman. Two engines and 12 cars were wrecked and one engineman was injured.

24th, 8 p. m., on West Jersey & Seashore, at Newfield, N. J., butting collision between a passenger train and a wrecking train, badly damaging both engines. Two passengers and one employee were injured.

26th, on Southern Railway, near Eden, Ala., butting collision of freight trains, badly damaging both engines and 10 cars. Both enginemen were injured, one of them fatally, and 3 other trainmen were hurt.

27th, 4 a. m., on Union Pacific, near Hershey, Neb., butting collision of freight trains, wrecking both engines. Three trainmen and a tramp were injured.

30th, on Missouri Pacific, at Stillwell, Kan., butting collision of freight trains, wrecking both the engines and 15 cars, 8 of which contained cattle. The engineman and fireman of the westbound train were killed and the other engineman was injured. It is said that the eastbound train overlooked a meeting order.

And 5 others on 5 roads, involving 9 freight trains.

CROSSING AND MISCELLANEOUS.

1st, 1 a. m., on Missouri Pacific, at Yates Center, Kan., a passenger train collided with 4 freight cars which had been left standing on the main track, making a bad wreck. The baggage car took fire and, with 4 freight cars and parts of the engine, was burned up; enginemen and fireman badly injured.

7th, 3 a. m., on Pittsburgh, Cincinnati, Chicago & St. Louis, at Indianapolis, Ind., a passenger train collided with a switching freight train; one of the enginemen was killed.

16th, on St. Louis, Keokuk & Northwestern, near Ashburn, Mo., a passenger train collided with a switching engine, badly damaging both engines. A baggageman was injured.

17th, on New York, Lake Erie & Western, at Arling-

(Continued on Page 693.)

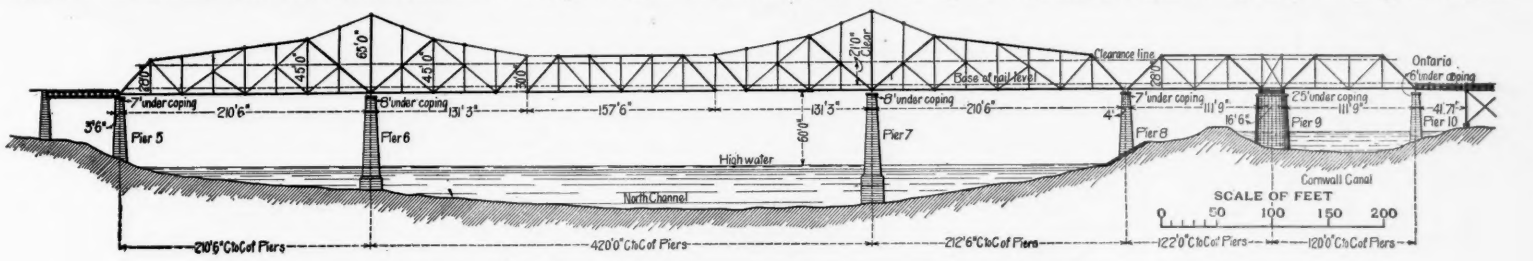


Fig. 2.—Bridge Over the North Channel of the St. Lawrence River at Cornwall.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.

Published Every Friday,

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

A New Composite Brake Shoe.

Few matters which have been investigated with so much labor and expense are generally so little understood and have been subject to so little actual improvement as brake shoes, and probably it is a good work to present the changes which have lately been made in brake shoes in such a way as to enable our readers to more readily form an opinion as to the merits in each case.

In our last issue we described a new brake shoe known as the "Diamond S," which, strictly speaking, can be called a composite shoe. This brake shoe embodies some important features which are not apparent on first inspection and which probably have not heretofore had sufficient attention.

In considering the worth of any brake shoe there are five principal points to be taken into account; namely, the friction, the durability, the uniformity of shoes of the same kind, the strength, and the effect of the shoe on the tire. We have placed friction first because it is the prime function of any brake shoe. It is not so important on steam railroads how many miles a brake shoe will make before being worn out as that in a case of emergency a stop can be made in the shortest possible distance. To accomplish this the other factors enter, but they are of minor importance. Any brake shoe which does not give a high uniform co-efficient of friction fails to fulfill the first requisite and is not safe to use. The only improvements of any consequence made in the last two or three years have been in combining materials in such a way that a high uniform co-efficient of friction would be secured, while at the same time neither the wearing qualities of the materials would be impaired nor the face of the wheel damaged. It is to meet such requirements that this new brake shoe has been brought out, as suitable for use with steel-tired wheels.

For steel-tired wheels there have been available soft cast-iron, chilled iron and soft composition brake shoes. Plain soft cast-iron shoes give a high co-efficient of friction, but wear rapidly; chilled iron shoes have increased wearing qualities at the expense of the friction and, as pointed out, for this reason are not safe to use. The soft composition shoes are now just beginning to receive serious consideration and have many good qualities, quite recently mentioned in these columns. There is no doubt that there is a wide field for a good brake shoe suitable for both steel-tired coach wheels and chilled iron wheels.

A consideration of the special features of the "Diamond S" brake shoe in the order previously given is interesting. Owing to the construction over 90 per cent. of this shoe is soft cast-iron and the remainder is soft steel. While tests so far made do not permit the co-efficient of friction to be calculated, yet it is well known that the friction given by a soft cast-iron brake shoe is higher than that obtained with any other plain metal shoe. With so large a percentage of cast-iron and because of the manner in which the steel is distributed, it is only reasonable to expect that the friction of this brake shoe is about the same as that of soft cast-iron.

On account of the ingenious use of expanded steel strips the disintegration of the cast-iron of this shoe is retarded, which action has been explained in the description. This is an improvement which should be especially noted; the durability of the cast-iron is increased by the construction, without sacrificing the frictional qualities. On account of the treatment which the steel strips undergo, by punching and expanding, the steel used is necessarily soft and of a uniform quality. The methods used in manufacture demand that the cast-iron shall be of a uniform mixture and have a uniform hardness. It therefore follows that because of this uniformity the action of one shoe will be practically the same as that of another. This matter of uniformity of different shoes of the same kind seems to be little considered, although it has frequently been brought up by the makers of air-brake equipment. One of the objections which has been raised against plain cast-iron brake shoes is that such shoes made in different foundries, and even in the same foundry, vary so widely in composition and hardness that there is seldom uniformity of action of the several shoes on the same car.

In the particular shoe we are now considering a radical departure has been made in the manner of combining the steel and cast-iron. The common method used has been to put four or five pieces of steel in the body of the shoe in the form of inserts, but such shoes have been shown to have some serious objections. The steel flows during heavy application and covers the cast-iron surface, resulting in a decreased friction and the cutting of the steel tires. Also, such shoes are weak in form and break near the middle where the section of the cast-iron is reduced by the insert. It has been noticed that when heavy applications of the brakes are made, with metal shoes fitting properly, the first action is for the shoe to heat on the face, causing the ends to spring up and leaving only the middle of the shoe in contact with the wheel. The shoe, therefore, becomes hot near the middle, and while in this condition the material at the middle is worn away rapidly. After a few such applications the shoe becomes so worn that when cold there is a bearing only at the extreme ends, the distance between the wheel and shoe at the middle, in some cases, being more than one-eighth inch. It can be readily seen that if a heavy application be now made the shoe will break, and where inserts are used the break takes pace through this weakened section. It will, therefore, be seen that the strength of the shoe is of considerable importance.

By the use of the expanded metal strips the pieces of steel are so small that there is not the tendency to flow as with the inserts, and also the cast-iron body of the shoe is tied together and strengthened by the introduction of the steel. This additional strength permits of these shoes in heavy service being worn until much thinner than the older forms without danger from breaking.

While this brake shoe in its present form consists of cast-iron and expanded sheets of soft steel, yet this is not the only combination of materials made possible by this construction. By the use of expanded metal in this way a great many materials can be used which are known to give high co-efficients of friction, and which heretofore could not be employed on account of the tendency to disintegrate. The use of expanded metal for composite brake shoes would appear to be a new and important departure from old methods and makes possible many desirable combinations.

Brown's Discipline.

The meeting of the Superintendents' Society, reported in another column, had but a small attendance, but was characterized as highly profitable by those who were present, and the lack of numbers was not due to deficient interest, as in some former years, but to the heavy business now prevailing keeping many members at home, and to the fear on the part of others that the quarantine regulations now in force in some Southern cities might cause delays in getting to or from the meeting place.

The principal discussion was on Brown's discipline, and the main point brought out was that "the old and the new methods are gradually coming to be alike," as one member expressed it. In other words many superintendents who do not feel ready to abolish suspensions are keeping individual records and posting bulletins of cases dealt with by discipline committees. There seems to be a fear on the part of some that the Fall Brook Railroad will get too much credit in this matter.

"Brown's discipline"—we use this term for brevity, not because we object to calling it by the name of the road or by any of the other names, more or less expressive, that are now in use—has three main features: 1, a record of each man's service; 2, bulletins of blunders, to educate employees who, without the bulletins, would learn little or nothing from the errors of fellow-workmen, and 3, abolition of suspensions from duty and cutting off wages as a means of punishment. A fourth element, a premium of $60 yearly to each freight conducter making a clean record, is an important one. This has been adopted by only one other road, so far as we know, the Cincinnati, New Orleans & Texas Pacific. Speaking generally, it may be said that this important feature of the Fall Brook practice has been omitted by other roads adopting it, while by some roads an important feature has been added, that of allowing credits, for long terms of good conduct, to offset previous demerits. At least we do not know that Mr. Brown has ever made a formal matter of giving credit.

The result of the discussion at Nashville was strongly in favor of the view that this plan is feasible and desirable on all American railroads. There was persistent opposition to this conclusion, as in past conventions, but we do not see that any important arguments were put forward or any that were not well met by the advocates of the new plan. A record of every man is necessary for simple justice and to provide for changes in the superintendency. Those who advocate suspensions and forgetting a man's past overlook the fact that different superintendent forget with different degrees of success; that the same one will forget some men's errors and not other men's, and that the best memory often irremediably forgets both good and bad points. The examination of an old record almost always impeaches one's memory. The claim of one speaker that giving credits detracts from the integrity of a vital feature of Brown's discipline, in that it blots out misdeeds which need to be remembered in order to fully know a man, is, we think, unfounded; the record is not blotted out, though the past is atoned for; it is not obliterated, for the leaf in the book is still there; it is neither burnt up nor thrown away.

The usefulness of bulletins is as self-evident as that of records. The record shows the superintendent the facts; the bulletins interpret the facts for the trainmen or others interested. Trainmen of all grades often interpret the facts of an accident or incident wrongly, and it is the duty of the superintendent to set such men right. True, the wrong interpretation is not always due to ignorance, but sometimes to willfulness, but that makes it all the more necessary to persistently present the right one. No one can say that education by bulletins need be only a temporary matter, for as long as men make blunders it will be desirable to disseminate the lessons thereof. And new men can never be taught all the details of their duties before they are appointed, for they will not heed precepts as they ought until the pressure of responsibility sharpens their wits.

On the foregoing points there is a pretty fair agreement of opinion, or at least the objectors make no strenuous objections; but when we come to the abolition of suspensions the conservatives refuse to be convinced. This feature has always been recommended largely or chiefly on account of its good moral effect; the improvement of the personal relations between superior and subordinate and the enhancement of the feeling, on the part of the superintendent, that he is much more completely carrying out his ideal of full justice—and more—to every employee. But as experience accumulates more is said about the material advantages to be derived from the change; the saving of wages to the men, and the economy and the more satisfactory results in manning freight trains, which follow the reduction of the force of extra crews. To keep hanging around from 20 to 50 irregular men for every 100 regulars is not a normal method. The extra men are to some extent living on other men's misfortunes and their presence helps to keep the whole force disturbed.

While it is right to make full allowance for these material advantages, it is still true that the moral advantage is more important. The improvement in a man's relations to his superior and to his fellow-workmen, and his better appreciation of duty and discipline are more valuable to him than the money he saves. Suspension is a crude method of punishment which, like the judicial punishment prescribed by the state for some crimes, is justifiable only on the theory that nothing more suitable is practicable. The most rational, perhaps the only rational, theory of the treatment of negligent employees is that which embraces three degrees, caution, reprimand and dismissal. This obtains in many employments. Suspensions, whether actual or "book suspensions," may be looked upon as preliminaries to a dismissal, and with

employees possessing fairly active consciences a reprimand would be just as effective, if the plan were understood.

The only argument presented at Nashville against the abolition of suspensions which had any logic in it was that the superintendent could not safely give up his prerogative of dealing severely with tough cases; but this, like the others, was based on a misapprehension of what is actually done by those roads which have abolished suspensions. No superintendent gives up any necessary prerogative. Neither is Mr. Brown's plan rigid and inequitable. He is as free as ever to refrain entirely from punishing a worthy employee who has a good record, or to impose a very light sentence. There is no maximum limit of 10 or any other number of "days" in recording marks against a delinquent. The superintendent is as free as ever to discharge a man whenever the good of the service requires it, and as free as ever to use his own judgment without going to unnecessary lengths in explaining his reasons.

We have heretofore called attention to the great value of Mr. Brown's $60 premium. It cannot be other than a great incentive to every conductor to do his best. It has been characterized as a standing threat of a $60 fine for the first infraction of discipline. Whether that is or is not a fair way of looking at the matter, we are very sure that the principle is a good one. As long as there are differences is the efficiency of different men, the establishment of different rates of pay for the same work is an effective method of inciting men to do their best.

Giving credits so as to relieve a man of the consequences of a bad record is still an experiment.

One reason for suspending men, which was brought out at Nashville, was a new one. A superintendent had suspended a negligent highway crossing tender, and said that if he were to keep the man in service, when everybody knew that he had endangered a carriage at the crossing, the public would justly feel imposed upon and very likely would remonstrate. We doubt the force of this view. If the man is unfit for the place he should be dismissed. If he does not deserve dismissal, and is reinstated, will not the public be just as critical 30 days afterward? It will not generally be practicable to make the public understand all the reasons for reinstating a derelict employee. The public is fickle at best, and such a suspended man could quickly get a big petition to have his place be given back to him, without much regard to the degree of negligence he had been guilty of.

August Accidents.

Our record of train accidents in August given in this number, includes 64 collisions, 61 derailments and 3 other accidents, a total of 128 accidents, in which 32 persons were killed and 140 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

Collisions.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	8	0	0	8
Misplaced switch	1	1	1	3
Failure to give or observe signal	3	1	4	8
Mistake in giving or understanding orders	0	3	1	4
Miscellaneous	8	2	5	15
Unexplained	13	7	6	26
Total	33	14	17	64

Derailments.			
Broken rail	1	Unfastened switch	1
Loose or spread rail	3	Runaway train	3
Defective bridge	2	Animals on track	1
Broken wheel	4	Landslide	2
Broken axle	6	Malicious obstruction	1
Fallen brakebeam	1	Accidental obstruction	4
Failure of drawbar	4	Unexplained	21
Failure of brake hose	1		61
Broken car	2		
Misplaced switch	4		

Other Accidents.	
Boiler explosion	1
Broken side rod	1
Other causes	1
	3
Total number of accidents	128

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Total.	P. c.
Defects of road	0	6	0	6	4
Defects of equipment	8	18	2	28	23
Negligence in operating	30	8	1	39	31
Unforeseen obstructions	0	8	0	8	7
Unexplained	26	21	0	47	35
Total	64	61	3	128	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Passenger	20	15	1	36
Freight and other	91	47	2	140
Total	111	62	3	176

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Killed:				
Employees	6	8	3	17
Passengers	2	0	0	2
Others	1	12	0	13
Total	9	20	3	32
Injured:				
Employees	36	16	3	55
Passengers	43	24	0	67
Others	3	15	0	18
Total	82	55	3	140

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road	0	10	2	2
Defects of equipment	0	0	3	4
Negligence in operating	2	50	7	39
Unforeseen obstructions and maliciousness	0	0	0	2
Unexplained	0	7	5	8
Total	2	67	17	55

Twenty accidents caused the death of one or more persons each, and 25 caused injury but not death, leaving 83 (65 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with August of the previous five years shows:

	1897.	1896.	1895.	1894.	1893.	1892.
Collisions	64	48	53	25	50	94
Derailments	61	54	71	89	90	119
Other accidents	3	2	8	9	7	8
Total accidents	128	104	132	150	147	221
Employees killed	17	39	30	25	28	35
Others killed	15	18	19	25	38	15
Employees injured	55	53	41	94	67	104
Others injured	85	87	99	42	95	109
Passenger trains involved	36	35	48	44	55	68
Average per day:						
Accidents	4.13	3.36	4.26	4.84	4.74	7.13
Killed	1.03	1.52	1.58	1.61	2.13	1.61
Injured	4.52	4.52	4.52	4.39	4.94	8.69
Average per accident:						
Killed	0.25	0.45	0.37	0.33	0.44	0.22
Injured	1.10	1.34	1.06	0.90	1.04	0.96

Only two passengers were killed in train accidents in August, so far as we have discovered; one at Alta Vista, Ia., on the 25th, and one at Lima, O., on the 20th. In the first-mentioned case the passenger was in the caboose of a freight train which was standing at the station, and the cause of the collision was simply neglect of the rule requiring stations to be approached with speed under control. The collision at Lima was on a crossing which appears to have had no fixed signals whatever, the enginemen of the respective roads exercising their own judgment as to the safety of their respective paths, after the fashion of A. D. 1847. A passenger train fell through a bridge at Byers, Col., on the night of Aug. 2 and one passenger car was partially submerged, but no passenger was killed. An excursion train carrying 500 passengers was derailed at Riverdale, Ill., but fortunately it was moving slowly. Of the derailments due to malicious obstruction, one, that of Aug. 9, was within a few miles of New York City, a reminder that this class of "fiend" does not confine himself to the West. Two freight trains were involved in the wreck, the road being a four-track line. A number of ties had been placed on the track.

Among the train accidents which will *not* be found in our list is one reported in a press dispatch from Dahlgren, Ill., on the 18th, in which it was said that a butting collision of freight trains had resulted in the instant death of two enginemen, two firemen and two brakemen. An officer of the road informs us that the collision was slight, causing no injury to any person.

There were in August 17 electric street car accidents of sufficient importance to be chronicled in the daily newspapers. Four of these occurred in Brooklyn, N. Y. There is the usual list of butting collisions, runaways, street cars running into freight or passenger trains and freight trains running into street cars. In one case, at Alameda, Cal., a hand car drawn behind a street car, by means of a long rope, ran off the track and derailed a street car running in the opposite direction. At Paterson, N. J., a car became uncontrollable by reason of the breaking of a brake chain on a steep grade, the result no doubt of a risk which is taken by roads all over the country many times daily.

In Philadelphia, on the 19th, a car became uncontrollable in consequence of a powerful current being supplied to the motor by a broken wire which fell from the poles to the street and was drawn under the car by getting snarled in the running gear.

On the Troy & New England electric road at Albia, N. Y., there was a butting collision between a passenger car and a freight car, in which two persons were killed and 20 or more injured. In all these street car accidents the total number killed was two and of injured 76.

In Brooklyn, N. Y., on the 22d, an electric street car ran into a carriage containing a large party, and more than 20 persons riding in the carriage were injured, the injuries of several of them being reported as fatal. We have not included this in the list of street-car accidents, although it appears that it caused a blockade of traffic for some time. The instance affords an interesting commentary on the grade crossing disaster at a crossing of the Long Island road at Valley Stream, near Brooklyn, last May. The circumstances of the two cases are similar, except that in the Valley Stream case the train was held by the newspapers to be an unlawful intruder upon the street, while in this August case the rapidly moving vehicle which destroyed the wagon was presumably acting wholly within its rights; that is to say, running along the highway as fast as the motorman deemed to be safe.

Annual Reports.

Iowa Central.—In the year ending June 30, 1897, the company had smaller earnings than in any year since the reorganization in 1889. The fiscal year opened with large grain crops and the promise of good revenues, but the result of the year's working was a loss of nearly a seventh of the gross income and of a third of the net. This falling off was mostly due to the smaller tonnage carried. Of the decrease of 73,000 tons in freight carried, grain accounts for 45,000 tons and other agricultural products for 13,000 tons additional. The only important increase is in soft coal, of which 28,000 tons more than in 1896 were moved. The coal traffic is indeed the most important item of freight tonnage, being 54¼ per cent. of the whole.

The results of operation were as follows for three years:

	1897.	1896.	1895.
Miles worked	509	499	498
Freight	$1,186,592	$1,445,695	$1,211,123
Passenger	305,549	329,639	298,300
Earnings from operation	$1,564,204	$1,839,708	$1,569,220
Rentals	7,787	14,335	14,751
Maint. of way and structures	$321,358	$296,798	$281,054
Maintenance of equipment	133,768	157,601	122,647
Conducting transportation	555,110	616,487	531,927
General expenses	89,924	89,215	113,191
Operating expenses	$1,100,160	$1,159,452	$1,048,821
Net earnings from operation	$461,044	$680,255	$520,399
Taxes	$63,482	$62,869	$61,966
Total net income	408,348	631,721	473,184

Besides more than earning its interest in a trying year the company reduced its floating indebtedness by $52,000 and this account now stands at $144,000.

About $32,000 was spent in equipping cars with automatic couplers and air brakes, and 1,060 of the 1,826 freight cars owned now have air-brakes. The General Manager recommends still further improvements and the purchase of considerable new equipment this year so that larger trains can be handled and the cost of operation reduced.

Five Massachusetts Railroads.—Although some 50 railroad corporations make annual returns to the Massachusetts Commissioners, five of these conduct almost 99 per cent. of the entire passenger and freight traffic. From the returns of these five roads for the year ending June 30, 1897, it appears that the past year was fairly prosperous with them all, but each suffered from the competition of electric roads in addition to the "hard times." A loss of nearly 8,000,000 passengers and over 1,000,000 tons of freight shows the decrease in traffic.

Of the 99,679,011 passengers, 47,685,043 were to or from Boston. The New York, New Haven & Hartford carried the largest number of people—41,599,670, but only about one-third—13,429,636—were Boston passengers. The Boston & Maine stands next in total number of passengers—32,658,341, nearly two-thirds of them, or 20,221,896, being to or from the Hub. The Boston & Albany carried 11,296,337 in all, 7,003,400 being Boston travelers. The New England reports 7,078,092 passengers, 2,885,618 being credited to Boston, and the Fitchburg carried 7,046,571, more than half—4,144,493—being to or from Boston.

It may be noted that 24,366,389 passengers used the present Union station on the north side of Boston, while the roads that are to use the new southern station carried 23,317,654 Boston passengers, showing how evenly divided is the Boston passenger traffic. The Boston & Maine lost 2,474,651 passengers, the Consolidated 2,371,262, the Boston & Albany 1,491,990, the New England 1,234,380, and the Fitchburg 422,095 passengers from the previous year. With the exception of one road all report a small increased average distance traveled by passengers.

A few years ago the Boston roads depended largely upon their passenger business for earnings, freight being a secondary affair. With the single exception of the Consolidated road this is changed, the last year showing larger earnings from freight than from passengers on all the roads. The Boston & Albany was the only road which increased its freight during the year, gaining 18,443 tons and 2.223 miles average haul. The Consolidated lost 473,183 tons, but increased its haul 2.880 miles. The Boston & Maine lost 354,324 tons of freight but increased its haul 3.569 miles. The New England's tonnage and average haul both decreased, the former 305,800 tons and the latter 0.848 of a mile, and the Fitchburg also lost in both directions, having 304,856 less tons and its average haul decreasing 2.520 miles.

The management of all the roads anticipated the falling off in business and early prepared to meet it by cutting down expenses, and although the returns show a decrease of $2,979,246 in gross earnings, the operating expenses were reduced $3,053,150, so there was an actual gain in operations of $73,904, and this would have been much larger had not the New England road's loss in earnings overbalanced its saving in operating expenses by $430,380. With the exception of the latter road, all made net gains in operation, the Consolidated's being $371,672, the Boston & Maine's $83,746, the Fitch

ourg's $31,489, and the Boston & Albany's $17,377. While the New England saved $280,643 in operating expenses, its loss in earnings amounted to $711,023. The following is a comparison of the earnings and expenditures of the two years:

		Boston & Albany.	Boston & Maine.	Fitchburg.	New England.	New York, New Haven & Hartford.
Gross earnings	1896	$9,350,632	$20,499,768	$7,606,765	$5,948,214	$30,345,630
	1897	9,114,625	19,640,846	7,155,768	5,237,191	29,623,333
Decrease for	1897	236 007	858,922	450,997	711,023	722,297
Operating expenses	1896	6,203,175	14 506,940	5,462,316	4.278.516	21,137,227
	1897	5,949,791	13,564,272	4,979,830	3,997.873	2 ,043,258
Decrease for	1897	253,384	942,668	482,486	280,643	1,093,969
Gross income	1896	9,350,632	21 194,975	7,606,765	5,967,796	31,201,316
	1897	9,114,625	20,193.669	7,155,768	5,327,037	30,237,405
Decrease for	1897	236,007	901,306	450,997	640,759	1,163,911
Gross expenses	1896	7,327,845	19,789.506	6,974,038	5 852,722	27.534,424
	1897	7,074,055	18,924,374	6,522,470	5,569,132	26,359,159
Decrease for	1897	253,790	865,132	451,568	283,590	1,175,265
Net divisable income	1896	2,022,786	1,305 469	632.727	115,074	3,666,892
	1897	2,040.570	1,269.295	633,299	*242,095	3,878,245

*Deficit.

Besides these five standard gage roads there is a narrow gage—Boston, Revere Beach & Lynn—that does considerable passenger business. It operates only 13 miles of road, but it carried this year 2,368,219 passengers, 2,006,172 being to or from Boston. Its receipts (wholly from passengers) were $221,638, its operating expenses were $183,838, interest $48,671, taxes $6,276 and its net divisable income $25,744. It paid $25,500 in dividends and had a surplus of $244.

As a means of readily comparing the operations of the standard gage roads the following table is given.

	Boston & Albany.	Boston & Maine.	Fitchburg.	New England.	New York, New Haven & Hartford.	Totals.
Number of passengers	11,296,337	32,658,341	7,046,571	7,078,092	41,599.670	99,679,011
Passenger mileage	214,657,453	483,987,417	112,161,296	81,749,948	756,540,942	1,652,097,056
Average miles per passenger	19.002	14.820	15.920	11.974	18.190	16.544
Passengers to and from Boston	7,003,400	20,221,896	4,144,493	2,885,618	13,429,636	47,685,043
Tons of freight	4,130,855	9,892,705	4,471,244	3,077,243	10,391,726	31,963,773
Freight mileage	449,039.417	688,011,072	504,715.428	294 339 760	839,960,369	2,776,086,046
Average miles per ton	108.708	69.547	112.880	95 650	80.830	86.851
Revenue from passengers	$3,764,824	$8,538,278	$2,031,308	$1,671,804	$13,618,250	$29,624,464
" " mails	295,884	323,572	78,822	61,611	507,658	1,267,547
" " express	277,268	614,452	160,789	118,865	975,428	2,146,802
Other earnings passenger service	132,694	101,949	42,801	58,339	866,528	1,205,311
Total passenger revenue	4,470,670	9,581,251	2,313,720	1,910,619	15,969,864	34,244,124
Revenue from freight	4,124,320	9,975,436	4,391,570	3,162,252	12,922.042	34,575,620
Other earnings freight service	302.667	68,510	381,896	156 488	418,171	1,327,732
Total freight revenue	4,426,987	10,043.946	4,773.466	3,318,740	13,340,213	35,903,352
Other earnings from operation	216,958	15,649	68,582	7,832	315,256	624,287
Gross earnings	9,114,625	19,640.846	7,155,768	5,237,191	29,623,333	70,771,763
Other income	.....	552,823	.....	89,846	614,072	1,256,741
Gross income	9.114,625	20,193,669	7,155,768	5,327,037	30,237.405	72,028,504
Operating expenses	5,949,791	13,564,272	4,979,830	3,997,873	20,043,258	48,535,024
Interest	337,980	1,104.726	1,023,512	999.176	1,217,987	4.683,381
Taxes	708,284	988,348	259,118	263,218	1.647,741	3,866,742
Rentals	78,000	3,198,428	259,980	308,865	3,450,172	7,295,442
Other charges	.....	68,600	.....	.....	.....	68,600
Gross expenditures	7,074,055	18,924,374	6,522,470	5,569,132	26,359,159	64,449,192
Dividends paid	2,000,000	1,234,002	603,754	.....	3,803,516	7,641,272
Surplus for the year	40,570	35,293	29,544	*242,095	74,728	*61,961
				* Deficit.		* Deficit.

The Chicago *Times-Herald* has gathered the opinions of some 30 jurists, publicists and laymen residing in the middle west, regarding the legality of injunction writs for quelling strikes. The *Times-Herald* has heretofore been a strenuous advocate of injunctions in labor troubles. Six of the judges sending answers strongly condemn the process as a means of relief, while two of them, Gibbons and Tuley, the latter Chief Justice of the Supreme Court of Illinois, protest against it. Mr. Justice Clark of the Supreme Court of North Carolina says: "The practice of issuing injunctions in labor disputes is without warrant, reason or precedent. It is a denial to the citizen of the right of trial by jury, by judges who *enact* the law by their own decrees, and then *execute* it by the penalty for contempt." Equally vigorous in condemnation is the language of Judge Gibbons of the Circuit Court: "Within the past decade there has been introduced in our country—made a law—an innovation in judicial precedure, which is odious to the vast majority of the people. I refer to judicial government by injunction, which has so frequently been exercised of late. I do not question or deny to the government or to individuals the privilege of invoking the aid of chancery when property rights are threatened or endangered. But I would admonish the advocates of this innovation that they are treading on dangerous ground. In their efforts to regulate or restrain strikes by injunction they are sowing dragon's teeth and blazing the path of revolution." And in a similar vein Judge Chetlain contends for a better method of adjusting social disorders. Either Congress or a state legislature might define and prescribe reasonable limitations upon the exercise of the injunctive power; this view is approved by many well-informed publicists, and they regard such legislation as not only desirable, but, in view of the strained relations now existing between capital and labor, necessary. Judge Grosscup and Judge Tuttle take the opposite view, and insist that the courts must have ample powers in order to enforce any judicial mandate, or inspire respect for judicial process. While there is much in favor of the position taken by these last two, still, in the majority of instances, the violators of an injunction are men utterly irresponsible, in a pecuniary sense; to impose a fine is to enact a farce, and the court can only inflict the penalty of imprisonment. But for Congress to specifically define the nature and scope of the evidence necessary to procure an injunction, and make limitations as to the effect of the writ, when issued, upon the parties enjoined, is a difficult and delicate task, and no one seems to feel equal to it. Moreover, the United States Supreme Court has practically decided, unanimously, that the courts which, during the past few years, have issued injunctions in various novel situations, have done right. In the Debs case it justified Judge Woods in keeping that agitator in jail a year, although conservative and intelligent laymen regarded the judge's action as a dangerous infraction of the right of trial by jury. In view of this action of the highest court it is not exactly clear what these minor judges are driving at when they give their opinions through a newspaper, to say nothing of the bad taste of such utterances.

NEW PUBLICATIONS.

The Materials of Construction. A Treatise on the Strength of Engineering Materials. By J. B. Johnson, C. E., Professor of Civil Engineering in Washington University. Octavo; 787 pages; 650 illustrations, 11 plates and complete index. New York: John Wiley & Sons; London: Chapman & Hall, Limited. 1897. Price $6.

We briefly noticed the publication of this very excellent book in our issue of April 30, but have delayed a fuller review until this time. Professor Johnson's earlier works, namely: "Theory and Practice of Surveying," "Modern Framed Structures," and "Contracts and Specifications," have already made him widely known to readers of engineering literature. This latest book marks a greater advance in engineering literature, and will doubtless find an even wider field of usefulness than his former works, for it will be of great value not only to engineers and architects, but to a large class of manufacturers, and to builders of structures and machines; and the purchasing agent will find it a valuable book of reference. It is richer in new and important information regarding the strength of materials than any other similar work in the English language. While each subject is treated with necessary fullness, there are a condensation and order which enable one readily to obtain just the information he desires without having to search through a great deal of matter, more or less interesting, but of little real value.

The book is divided into four part under the following headings: Part I., Synopsis of the Principles of Mechanics Underlying the Laws of the Strength of Materials; Part II., Manufacture and General Properties of the Materials of Construction; Part III., Testing Machines and Methods of Testing; Part IV., Mechanical Properties of the Materials of Construction as Revealed by Actual Tests.

Part I. is condensed into 88 pages, and, as the author states in his preface, "when the book is used as a text-book in schools of engineering . . . only portions of Part I. are required to supplement the students' course in applied mechanics." For the engineer this brief treatment of the theory of the strength of materials and mechanics will be found useful for refreshing his memory with formulæ, etc. In this part there are chapters on the general nature of deformation and stress; materials under tensile stress; under compressive stress; under shearing stress, and the resilience of matetials.

Part II. contains 215 pages, embracing chapters treating of cast iron, wrought iron, steel, minor metals and their alloys, lime, cement mortar and concrete, paving brick and timber. The several kinds of mechanical tests are each treated of in a separate chapter in Part III. This part covers 160 pages and contains the latest information on the subject of methods of testing in use in this country and abroad.

Part IV., on the mechanical properties of materials, covers 273 pages, and presents a most valuable collection of results of mechanical tests made in Europe and this country. Instead of using long tables of figures, Professor Johnson has adopted the graphical method of presenting the results of most of the tests recorded, and these diagrams show at a glance the significant facts. With intelligently arranged diagrams it is possible readily to discover the laws of relationship, and moreover these laws become permanently impressed upon one's mind by diagrams. Tabulated results do not make such impressions. The chapters in this part are, one each, upon the strength of cast-iron, wrought-iron and steel; also upon the fatigue of metals; the strength of copper-zinc-tin alloys; the effects of temperature on the mechanical properties of metals; results of tests on cement, on cement mortars and concretes, and on stone and brick; experimental values of the strength of timber; strength of iron and steel wire rope, and a chapter on the magnetic testing of iron and steel by Mr. W. A. Layman, M. S.

There are four appendices to the book, containing a biographical sketch of Prof. Johann Bauschinger; a study of iron and steel by micrographic analysis by Prof. J. O. Arnold, of Sheffield, Eng.; a comparative analysis of the resolutions of the conventions of the French Commission and the American Society of Mechanical Engineers and others on testing materials and standard specifications for iron and steel. These latter include the specifications proposed by a committee of the American Society of Civil Engineers, those proposed by Mr. H. H. Campbell, and those adopted by the Association of American Steel Manufacturers. Throughout the book the author has used the English units of weights and measures, and all of the results of foreign tests have been reduced to these standards, so that they may be readily grasped by English readers.

One of the noticeable features of the book is the author's introduction of a new elastic limit, or as he calls it the "apparent elastic limit." After calling attention to the very wide variations in the determinations of the elastic limit of the same material by equally careful means, he proposes the following arbitrary definition of this "*apparent elastic limit.*" "*The point on the stress diagram of any material, in any kind of test, at which the rate of deformation is 50 per cent. greater than at its origin.*" This point is determined graphically by finding the point of tangency to the stress curve of a line having an angle of inclination to the load ordinates 50 per cent. greater than the inclination of the stress curve itself at its origin. He states that this point will be found slightly beyond the true elastic limit, but that it will mark a point corresponding to a permanent set much less than can be measured on any scale by the naked eye, and hence may be regarded as the true elastic limit for commercial purposes. Probably the greatest argument for the general adoption of the author's recommendation is the fact that wherever stress diagrams are used it would be possible for all experimenters to determine exactly the same relative point for the elastic limit, thus eliminating the factor of individual judgment in the selection of this point. However, where there are no stress diagrams made, as in ordinary commercial tension tests, this proposed "apparent elastic limit" could not be determined. In fact, it seems that in such tests it is only possible, or practicable, to determine the "yield point" and the ultimate strength. This "yield point" is very generally though erroneously termed the elastic limit, and some recognition of this difference should be made in all specifications. This is done in the specifications proposed by the committee of the American Society of Civil Engineers, while in the specifications proposed by Mr. H. H. Campbell the "elastic limit is to be determined by the drop of the beam." This is the "yield point" and not the elastic limit at all.

The large amount of space given to the subject of timber is, as stated by the author, "not more than its importance as a structural material, and the general absence of scientific information on the subject would seem to demand." It is only of late that there has been much scientific knowledge of timber. The fact that Professor Johnson has had entire charge of the very extensive mechanical tests of timber made for the Forestry Division of the United States Agricultural Department, in the testing laboratory of Washington University (St. Louis), is reason enough for the presentation of the results to date of this work. The author states that some 40,000 of these tests have so far been made under his direction. The chapters on timber will therefore be found exceedingly valuable for study and reference, containing as they do important information not elsewhere obtainable at this time.

The author has made very free use of the reports of tests at the United States Arsenal at Watertown, and the report of the French Commission on the Standardization of Tests of Materials of Construction (1895), and also of the communications of Bauschinger, Tetmajer and Martens. He pays a high tribute to the late Professor Bauschinger in the preface and uses his portrait as a frontispiece. Throughout the text are found copious extracts from the writings of well-known experts on the several subjects treated, and as their names always appear one knows what weight to give to these statements.

Typographically the book is fully up to the high standard of the publishers and the large clear type used

makes it easy to read. The great number of diagrams presented are all remarkably clear and free from the confusing appearance so often found when too much information is crowded into single diagrams. We feel sure the book will fill an important place in engineering literature and it deserves to have a wide sale. The price, $6, is very low considering the great amount of useful information it contains and the immense labor that its preparation must have involved.

Train Accidents in the United States in August.

(*Continued from Page* 689.)

ton, N. J., a passenger train ran into a gravel train, wrongfully standing on the main track, and the engine was ditched. Two laborers on the gravel train were injured.

20th, 10 p. m., at Lima, O., a freight train on the Lake Erie & Western ran into a passenger train of the Detroit, & Lima Northern at the crossing of the two roads. Two passenger cars were overturned and 31 passengers were injured, one of them fatally. There are no signals at the crossing.

22d, on Texas & Pacific, near Shreveport, La., collision between a switching engine of the Texas & Pacific and a freight train of the Kansas City, Pittsburgh & Gulf. Both engines were overturned. Three trainmen on each train were injured.

30th, at Mt. Jewett, Pa., a passenger train of the Bradford, Bordell & Kinzua ran into some freight cars of the Mt. Jewett, Kinzua & Riterville at the crossing of the two roads, badly damaging the engine and several freight cars. Three trainmen were injured. The freight train was run upon the crossing without first giving a proper signal to the passenger train.

And 10 others on 8 roads, involving 2 passenger and 17 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

3d, on Chesapeake & Ohio, at Morrison, Va., a fast freight train broke through a trestle bridge and six cars were wrecked.

3d, on Union Pacific, near Byers, Col., a passenger train broke through a small bridge, which had been weakened by a flood, and the engine and first four cars were wholly or partially submerged in the stream. The engineman and the baggageman were killed and the fireman and ten passengers were injured.

7th, 3 a. m., on Houston & Texas Central, near McKinney, Tex., a freight train was derailed by a broken rail, and a fire, due to some cause which is not clearly explained, broke out in the wreck. It caused the explosion of two cars of petroleum and destroyed the caboose and two spans of the bridge over Wilson Creek. A brakeman and a bystander were badly burned and many spectators were slightly burned. Eleven cars of oil were saved.

And 3 others on 2 roads, involving 3 freight trains.

DEFECTS OF EQUIPMENT.

4th, on New York, Chicago & St. Louis, near Irving N. Y., a freight train was derailed by a broken axle and 13 cars were wrecked. Three tramps were killed and a fourth was injured.

20th, on Pennsylvania road, at Elizabeth, N. J., the tank of an oil car in a freight train having become loosened rolled off the frame of the car and fell directly in front of a freight train on an adjoining track moving in the opposite direction. This train ran about 1,000 ft. before it could be stopped, and the tank, which lay lengthwise of the track, was pushed that distance without derailing the engine. The oil car was derailed, and fell against the other train, doing considerable damage.

26th, 2 a. m., on Pennsylvania road, near Frazers, Pa., a car in a freight train was derailed by a brakebeam which fell upon the track and 8 cars were wrecked. Two tramps were killed and another injured. The fireman, who was on the top of one of the freight cars, was injured.

28th, on Northern Pacific, near Bozeman, Mont., a freight train was derailed by a drawbar which was pulled out and fell upon the track, and 6 cars were wrecked. A brakeman was injured.

And 14 others on 11 roads, involving 2 passenger and 12 freight and other trains.

NEGLIGENCE IN OPERATING.

3d, on West Jersey & Sea Shore, at Atlantic City, N. J., the last car of a passenger train was derailed by the premature movement of a switch; 2 passengers were injured.

6th, on Memphis & Charleston, near Stratton, Ala., passenger train No. 5 was derailed by a misplaced switch and the first two cars were overturned. Two trainmen were injured.

13th, on Union Pacific, Denver & Gulf, near Manitou Junction, Colo., a freight train which was switching at the head of a steep grade became uncontrollable and the engine and 15 cars ran at high speed 5 miles to Franceville, where the whole train was ditched. The fireman was fatally injured.

22d, 8 p. m., on Chicago & Calumet Terminal, near Hammond, Ind., an excursion train was derailed at an unfastened switch and 5 passengers were injured.

And 4 others on 3 roads, involving 4 freight trains.

UNFORESEEN OBSTRUCTIONS.

9th, 9 p. m., on Central of New Jersey, near White House, N. J., an eastbound freight train running about 30 miles an hour was derailed by a pile of ties lying upon the track, blocking both main tracks. A westbound freight train passing at the time was derailed and 3 cars fell down a bank.

15th, 11 p. m., on Southern Pacific, near Roseburg, Or., a freight train was derailed by a stump which fell down the mountain side and lodged upon the track, and 14 cars were ditched. The engine and 8 cars fell into Cow Creek, and a portion of the wreck was destroyed by a fire that was started by the stump, which was burning when it fell. A tramp was killed and the fireman and 3 tramps were injured.

17th, on Union Pacific, at Laramie, Wyo., a gravel train, moving backward, was derailed by running over a cow, and 6 cars were wrecked. A brakeman was injured.

And 5 others on 5 roads, involving 2 passenger and 3 freight and other trains.

UNEXPLAINED.

4th, on Southern Pacific, near Reno, Nev., the first 3 cars of a passenger train were derailed and the engine was overturned. The baggage, express and mail cars were wrecked, and 6 Indians stealing rides were killed. The passenger cars were badly damaged. The engineman and fireman were injured, and 9 tramps were slightly hurt.

8th, on the Long Island road, at Van Sicklen Station, Brooklyn, N. Y., a passenger train of the Brooklyn Elevated road was derailed and 4 passengers were injured.

9th, 1 a. m., on Grand Rapids & Indiana, near Geneva, Ind., a freight train was derailed, and one of the cars, running upon a bridge, weakened one span, which, with the engine and 5 cars, fell into the Wabash River. The engineman and one brakeman were injured, the former fatally.

9th, on Cincinnati & Northern, near Celina, O., a passenger train of the Grand Rapids & Indiana was derailed and all three of the men on the engine were injured, the pilot fatally. The engine was running tender first.

12th, on the Missouri, Kansas & Texas, near Caddo Mills, Tex., a passenger train was derailed and the baggageman was killed; 3 passengers were slightly injured.

26th, on Atlantic City Railroad, at Hilltop, N. J., the engine and first 3 cars of a mixed train were derailed and badly damaged the engine being ditched. The conductor was injured.

29th, 2 a. m., on Chicago & Alton, near Alton, Ill., a passenger train was derailed and the engine and baggage car fell down a bank. The engineman and fireman were injured.

31st, on Tennessee Coal, Iron & Railroad Co.'s line, at Pratt City, Ala., a freight train was derailed and the engine was overturned. The engineer and fireman were killed.

And 13 others on 13 roads, involving 1 passenger train and 12 freight and other trains.

OTHER ACCIDENTS.

5th, on the Atchison, Topeka & Santa Fe, near Las Vegas, N. M., the locomotive of a passenger train was badly damaged by the breaking of a parallel rod. The fireman jumped off and was killed and the engineman was badly injured.

31st, 1 a. m., on Philadelphia & Reading, in Philadelphia, Pa., a derrick car in a wrecking train came in contact with an overhead bridge, knocking down the bridge and wrecking a signal cabin which stood beneath it. One employee on the train was injured.

31st, on Cleveland, Akron & Columbus, at Fredericksburg, O., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineman and fireman were killed. A brakeman was injured.

A summary will be found in another column.

TECHNICAL.

Manufacturing and Business.

Owing to the introduction of larger engines the Nippon Railway, of Japan, will be obliged to buy between 20 and 30 new turntables about 48 ft. long. The matter will be settled soon after Mr. Y. Kunisawa, Engineer of Maintenance of Way, reaches Tokio, which will be the latter part of October.

The main shops of the Youngstown Bridge Co., at Youngstown, O., were burned to the ground on the morning of the 22d inst. The shops were crowded with orders and a large amount of material nearing completion will be somewhat delayed. The Directors have decided to rebuild the plant of fireproof construction.

The Empire Forge Company, of Lansingburgh, N. Y., announce that they have engaged Mr. Ludlow S. Sherwood and Mr. Will I. Sherwood, of Nyack, N. Y., to sell their forges, sash pulleys and specialties in the Middle Western States, formerly covered by the late Mr. Samuel C. Gault, of Cincinnati. These gentlemen have been on the road for 15 years and have an extended acquaintance among the trade.

The roof of the new Spence Library of the Union Theological Semiary at Richmond, Va., will be of fireproof construction. The trusses will be steel, and the covering slate attached directly to metal supports. One end of the building is round, making a conical shape roof, and at various points of the roof slope are placed dormers and skylights. The peculiarity of the construction makes the iron work very intricate in order to get the pleasing, architectural appearance desired. The contract for furnishing and erecting the steel work for the roof has been given to the Berlin Iron Bridge Company of East Berlin, Conn.

The shafting and the heavier machinery of the Landis Tool Works, at Waynesboro, Pa., are in place, and work with full force will soon be begun. Orders are now in hand to keep the works running for some months.

The Steel Storage & Elevator Construction Co., of Connersville, Ind., has the contract for building the new grain elevator of 1,500,000 bu. capacity which the Canadian Pacific is putting up at Fort William, Ont. This grain warehouse, like others heretofore built by the Connersville Company, is composed of cylindrical steel tanks.

McCord & Co. report that their journal box and lid have recently been specified on 1,200 C., B. & Q., 700 Armour, 50 Swift. refrigerator, 250 P. & L. E., 250 C., M. & St. P., and has been included in the standard specifications of the L. S. & M. S.

Iron and Steel.

The Bessemer plant of the Johnson Co., of Lorain, O. will begin operations this week after an idleness of about six weeks.

The American Steel Casting Co., Sharon, Pa., will soon begin the building of another addition to their works which will considerably increase the capacity of the plant. With the new addition the works will employ about 350 men in all departments.

The plant of the Wellman Iron & Steel Co., of South Chester, Pa., will be sold at sheriff's sale Oct. 16 at noon. This includes a blast furnace, Bessemer converting works with two 3-ton converters, a blooming mill with one 26-in. reversing crane, etc., open-hearth steel works with two 15-ton and two 20-ton converters, a power plant with two electric generators of 200 H. P. capacity, hydraulic accumulators, etc., a water plant with Worthington pumps and all the necessary machinery and buildings for a very complete establishment.

The Braeburn Steel Works, owned by Mr. William Metcalf, his son and associates, at Braeburn, near Pittsburgh, are nearly completed. They will employ about 400 men.

The Rosena furnace of Oliver Bros. & Snyder, at Newcastle, Pa., was blown in Sept. 22. It has been under repairs for three months. This furnace has a capacity for 500 tons a day.

New Stations and Shops.

The Elyria Improvement Co. now have the foundations in for their new five-story office and store building, at Elyria, O. T. H. Brooks & Co., of Cleveland, are contractors for the 200 tons of structural work. S. B. Ford, of Lorain, is architect.

The new six-story store building on Ontario street, Cleveland, for E. R. Hull & Dutton, clothiers, will soon be completed. The structural work, of which there is about 600 tons, is being done by the King Bridge Co. John Eisenmann, of Cleveland, is the architect.

The Rock Island and the Burlington, Cedar Rapids & Northern are building a new station at West Liberty to replace one burned a few weeks ago. It will cost about $8,000.

The Chicago, Milwaukee & St. Paul will probably build a new station in Minneapolis. This station, if built, will of course be a large and important one.

The Sante Fe will, it is believed, soon put up a new building at Topeka for a wheel shop. This will be 40 × 60 ft.

The Canadian Pacific will build a fine new station at Morden, Man., to replace one burned last summer. It will be 35 × 70 ft., handsomely arranged and finished.

The Southern Railway is to build at Charlotte, N. C., a brick freight house 69 ft. × 300 ft.

Opening of the New Niagara Bridge.

The new steel arch at Niagara, the progress of which we have described in past issues, was again opened last week by what seems to be called a "carnival." Of course he bridge had been opened for traffic for a number of weeks, but the celebration last week was a popular entertainment designed to attract visitors and to give pleasure to the multitude, and a great many people were drawn to Niagara in the three days. The attraction consisted of illuminations, vaudeville performances, music, dancing on several platforms and other fantasias. During the three days of the celebration the highway deck was thrown open and visitors passed back and forth between the United States and Canada without payment of toll, and, we are informed, without restriction. We have not seen any estimate of how much the revenue of the United States fell off during those days Probably the most striking feature was the illumination of the Horse Shoe falls and the bridge and the rapids with colored fire and magnesium lights.

Oil Fuel on the Southern Pacific.

Lately the newspapers have said that the Southern Pacific was equipping its locomotives in Southern California to burn oil. A few months earlier the report was that they were taking off the oil-burning equipment. If we go still further back we shall find reports of equipping. All of these stories are substantially true, but not because the policy of the company is undecided or wavering in this matter. We have explained the situation before, but it is compactly summed up in the following extract from a recent letter from Mr. Kruttschnitt, which we print for the benefit of any puzzled reader:

"We have all along worked with a view of being entirely independent from the oil supply in Southern California. We have *certain* supplies of coal, but are willing to put oil burners on locomotives when the price of oil is satisfactory. When it rises above a certain price, as was the case in June and July, we simply take the burners off and return to coal. The large production has decreased the price, we have bought considerable quantities of oil, and have at the present time 11 locomotives equipped burning it. You will probably see such items as the one you sent me in the papers hereafter. We have never been willing to surrender to the oil interests our supply of fuel, and shall cease burning oil if they raise the price to a figure where no economy will result; conversely, we shall use it as long as the price remains reasonable."

The Atchison Weed Burner.

The car containing apparatus for burning weeds which is in use on the Atchison, Topeka & Santa Fe, and of which a drawing was shown in the *Railroad Gazette* of Sept. 10, is run behind the engine and the oil-supply car, the cab on the weed burner being run foremost. The jointed apron at the rear end of the car, which is attached to the shield on the truck, is held about 6 in. above the rails. The drawing shows an end sill of oak, but it has been found that it is necessary to make end sills and draft pieces of iron, the wood being soon destroyed by the heat.

New Air Power Company Formed.

The American Air Power Company, of New York, was granted articles of incorporation on Monday of this week. The company proposes to build power plants and to supply light, heat and power to railroads and manufacturing companies. Its directors are Francis A. Foraker and Arthur C. Hume, of 31 Liberty street, New York; Michael Sanford, of Hackensack, N. J., and John C. Breckinridge, of Brooklyn. The capital stock of the new company is $7,000,000. Efforts are being made to have the American Air Power Co. (incorporated under the laws of New Jersey), the General Compressed Air Power Co., both of 160 Broadway, New York, and

the Compressed Air Power Co., of 253 Broadway, New York, to unite their stock with the new company and all work together vigorously for an extended use of compressed air for traction. Before this can be done, however, it will be necessary to submit the question to the stockholders, which will probably be done in a very few weeks.

The American Air Power Co. has built a few motor cars for street railroads and a locomotive for the Manhattan Elevated on the Robert Hardie patents. The other company is building what is known as the Hoadley-Knight motors, the engineer of the company being Mr. Walter Knight. This company has attacked the question from a somewhat different standpoint and has made extensive experiments and tests resulting in the construction of a motor giving very good results. The *general* principle, however, on which the two different types of motors are built are very much the same, the difference being principally in the arrangement of the machinery. Inquiries have been received by the different companies from all parts of the world for information regarding the construction and operation of the compressed air cars and a few orders have been received by one of the companies, but as yet no orders have been filled.

Electric Equipment of European Tramways.

The British Thomson-Houston Company, of London, through its representative, Mr. A. A. Bayler, has just closed an important electric railroad contract with the companies operating the tramways of Dublin, Barcelona and Madrid. The contract for Doublin includes all steam as well as electric generating and motor equipment and comprises six Allis horizontal engines of 500 H. P. each supplied by Babcock & Wilcox boilers of sufficient capacity; six 500 KW. multipolar General Electric generators for direct connection to the engines and complete switch and switchboard and station equipment. The car equipment consists of 150 complete motors and series parallel controller equipment, the motors to be mounted with Peckham trucks. This contract follows closely that made for the equipment of the Clonparf Line of the Dublin tramway system which will be opened within the next week or two. The apparatus for this was also supplied by the British Thomson-Houston Company. The contracts for the Barcelona and Madrid roads cover five 400 KW. multipolar electric generators and three 75 KW. each, power to be directly connected to the engine shaft while the three latter will be lighting generators wound for 500 volts. This contract also includes full station equipment.

The Kaiser Wilhelm der Grosse.

The great North German Lloyd steamer, the Kaiser Wilhelm der Grosse, which has been talked about for months, reached the port of New York last Sunday evening, having made the run from the Needles to Sandy Hook in 5 days 22 hours and 46 minutes, beating the record of the St. Paul by 1 hour and 45 minutes. The successive day's runs were 531, 495, 512, 554, 564 and 186 knots. Her run of 564 knots exceeds by two knots the best westward daily run of the Cunarder Lucania. The average hourly speed was 21.39 knots. There seems to be some question as to the precise accuracy of these figures, but the margin is so large that there can be no doubt of the fact that this vessel now holds the record safely. It is, however, too early to speak of this ship as an entire success, from the point of view of the marine architect, at least. Passengers who were on board and who are competent to observe say that the vibration was very great, particularly when the ship was being driven through head seas. She also rolled heavily, and as her freeboard is about 15 ft. higher than that of the Lucania and Campania, the arc through which the man on the promenade deck is swung is pretty long. She has bilge keels, but for which the rolling would be considerably more severe. She leaked a good deal on the voyage over, and the pumps had to be run much of the time. We do not wish to be understood as saying anything in detraction of the splendid speed performance of this ship, but it is proper to put on record the fact that she was supplied with specially selected Cardiff coal for this run and that she carried 12 extra stokers. The day of the greatest run was through water as smooth as a mill pond, and of course the ship was lightened by the consumption of 2,000 tons or more of coal, and the water ballast tanks were filled only to give her 19 ft. draft forward and just enough aft to cover the screws. Under these conditions she ought to have made a record run for the day.

The accompanying table permits a comparison of the general dimensions and certain particulars, as well as of the best performances, of some of the largest and fastest steamships on the North Atlantic.

	Kaiser Wilhelm der Grosse.	Lucania.	Campania.	St. Louis.	St. Paul.	Fuerst Bismarck
Length over all. ...	648 ft.	625 ft.	625 ft.	554 ft. 2 in.	554 ft. 2 in.	525 ft.
Beam	66 "	65 ft. 3 in.	65 ft 3 in.	63 ft.	63 ft.	58 "
Depth.....	43 "	43 ft.	43 ft.	42 ft.	42 "	40 "
Tonnage.....	14,000 tons	12,950 tons.	12,950 tons.	11,629 tons.	11,629 tons	8,430 tons.
Passenger capacity	1,520	1,400	1,460	1,500	1,500	1,540
Engines.....	Triple expan.	Triple expan.	Triple expan.	Triple expan.	Triple expan.	Triple expan.
Cylinders.....	52 in., 89¾ in. and 96½ in.	37 in., 79 in. and 98 in.	37 in., 79 in., and 98 in.	55 in., 77 in. and 77 in.	55 in., 77 in. and 77 in.	43⅝ in., 66⅛ in. and 106⅝ in.
Horse power.....	30,000 H. P.	30,000 H. P.	30,000 H. P.	20,000 H. P.	20,000 H. P.	16,000 H. P.
Screws (diameter)..	22 ft. 3¾ in.	.....	.....	23 ft.	23 ft.	19 ft.
Boilers (number)...	.....	12	12	10	10	9
Boiler pressure.....	.....	165 lbs.	165 lbs.	200 lbs.	200 lbs.	170 lbs.
Best day's run.....	564 knots	562 knots.	553 knots.	530 knots.	540 knots.	502 knots
Best eastward time	.....	6 days, 8 hours, 38 min.	6 days, 9 hours, 18 min.	6 days, 10 hours, 14 min.	6 days, 12 hours, 10 min.	6 days, 10 hours, 55 min.
Best westward time	5 days, 22 hours, 46 min.	6 days, 7 hours, 23 min.	6 days, 9 hours, 6 min.	6 days, 2 hours, 24 min.	6 days, 31 min.	6 days, 9 hours, 43 min.

THE SCRAP HEAP.

Notes.

The Cleveland, Cincinnati, Chicago & St. Louis, the 'Big Four," is re-lettering all its passenger and freight cars so as to give prominence to the words "Big Four" in preference to the long names of the cities or their initials.

The machine shops of the Chicago Bridge & Iron Co., Chicago, covering nearly five acres of ground, were entirely destroyed by fire on Saturday evening, Sept. 25. The buildings were all one-story frame structures and contained the valuable stock of the company, consisting of iron and steel pieces, stationary engines, boilers and bridge material. There was some insurance and the loss is not yet known, although it will be considerable. The origin of the fire is not stated. About 150 men are thrown out of employment indefinitely, as the company has not yet decided what to do about rebuilding.

On the night of Sept. 25 a passenger train of the Oregon Railroad & Navigation Co. was stopped by four masked men eight miles from Portland, Or., and the engineman and fireman were robbed. The robbers failed to get anything from the cars, as, while they were robbing the two men in the bushes, a brakeman backed the train out of their reach. On the same night a westbound passenger train of the Northern Pacific was attacked near Moorhead, Minn. Here, again, the robbers miscalculated, all of the cars except the first two having been cut off without their knowledge. When the discovery was made they had gone forward about 3 miles.

The Pennsylvania "State Legislative Board of Railroad Employees" held a meeting at Scranton Sept. 23. It is said that 130 delegates were present. The President of this Board is E. B. Mitchell, of Harrisburg. It is stated that the Board usually meets only once in two year. It is not clear what constituency it represents or whether the deliberations of the meeting will have any effect on legislation, but resolutions were adopted calling upon Congress to pass the anti-ticket scalper bill and the pooling bill. The past conduct of a large number of members of the Pennsylvania Legislature was indorsed, the members being individually named, and the conduct of others, also named, was condemned, together with that of "a few others, well known to the Board, for antagonism shown us."

A South African Railroad.

The contract has been signed with Messrs. G. Pauling & Co. for the continuation of the Beira line to Salisbury, Rhodesia. Under the contract the railroad is to be in Umtali by the end of this year and in Salisbury by the end of next year. The line is to be 3 ft. 6 in. gage from Umtali to Salisbury.

Lake Excursion Business.

The whaleback "Christopher Columbus" has gone into winter quarters at West Superior. The records show a total of 81,143 passengers carried by the ship since the first trip to Chicago, beginning June 27. The greater part of this business was between Chicago and Milwaukee.

A Long Run on the Missouri Pacific.

The run of the westbound fast mail on the Missouri Pacific from St Louis to Kansas City, 284 miles, is now made by one engine.

One Hundred and Fifty Passengers Killed in India.

A press dispatch dated Sept. 24 reports that a passenger train on the Bangalore-Mysore Railroad, in India, had broken through a bridge, near Maddur, which had been weakened by a flood, and that the engine and five cars were entirely submerged in the stream. One hundred and fifty persons were killed and 14 injured. About 70 escaped.

The Huron Ore Hoists.

The ore hoists of the Huron Dock Co., at Huron, O., were badly damaged on the morning of Sept. 25, due, it is supposed, to overloading. The piling spread, allowing the tracks on which the hoists stand to settle.

North Carolina Railroad Commissioners.

Governor Russell, of North Carolina, on Sept. 23, issued an order suspending from office two of the three State Railroad Commissioners, Chairman J. W. Wilson (Dem.), and S. Otho Wilson (Pop.). In their stead were appointed John H. Pearson (Dem.), and L. C. Caldwell (Pop.). The Governor's displeasure at the refusal of the Commissioners to reduce transportation rates is supposed to be the cause of his action.

LOCOMOTIVE BUILDING.

The New York Central & Hudson River has placed with the Schenectady Works an order for 10 hard coal burning locomotives.

The Chicago & Northwestern has increased its order for 19 × 26 in. 10 wheel freight locomotives with the Schenectady Works from 10 to 15 engines.

The information published in some of the technical and daily papers that the Chicago, Burlington & Quincy is about to build 12 engines at the Aurora shops is incorrect.

As stated in our issue of Sept. 3, the Brooks Locomotive Works has an order for 20 locomotives for the Imperial Railways of Japan. They are to be 8-wheelers with 15 × 22 in. cylinders.

As stated in our issue of Sept. 10, the Houston East & West Texas has placed an order with the Baldwin Locomotive Works for seven 10-wheel freight engines. The Talbott M. C. B. coupler will be used at the rear of the tender and the Leeds coupler on the pilot.

The Baldwin Locomotive Works has completed a motor car for use on the lines of the Cincinnati, Hamilton & Dayton Traction Co. It is a complete and well-arranged street car with small Vauclain compound engines underneath and the necessary steam plant in one end.

The Iowa Central will increase its locomotive equipment this year by the addition of 15 locomotives. Their purchase has been recommended to the directors by the General Manager, and an order has been placed with the Pittsburgh Locomotive Works for six 10-wheel bituminous coal burning locomotives. These will have 18 × 26 in. cylinders.

The Pennsylvania is building at its Altoona shops 10 class P, 12 class L and 23 simple mogul locomotives. The 10 class P engines are to be equipped with Kiesel water scoops, Moran flexible steam joints, Janney couplers, Sellers & Nathan injectors and Westinghouse driver brakes. These locomotives have no truck brakes. The 12 class L locomotives will have the American driver and truck brakes, Janney couplers, Kiesel water scoops, Moran flexible steam joints and Sellers & Nathan injectors. The 23 mogul engines will not be equipped with truck brakes, but will have Janney couplers and Sellers & Nathan injectors.

CAR BUILDING.

The Chicago, Milwaukee & St. Paul has given an order to the Barney & Smith Car Co. for eight vestibule coaches.

The Southern Pacific Co., which placed an order some time ago with the Pullman's Palace Car Co. for 10 passenger coaches, is going to increase it to 30.

The Schoen Manufacturing Co. informs us that it has received an order to build 50 steel cars of 100,000 lbs. capacity for the Pittsburgh, Bessemer & Lake Erie Railroad.

Armour & Co. have placed an order for 200 additional refrigerator cars with the United States Car Co. These will be built at the Hegewich, Ill., shops of the car company.

The rumor that the Lake Shore & Michigan Southern is in the market for cars is denied by the President, who writes us that they are not ordering any new equipment at this time.

The General Manager of the Iowa Central in the annual report of the company recommends the purchase of 200 36-ft. stock cars, 50 48-ft. furniture cars and 6 passenger coaches.

The Southern Railway, which lately gave out some passenger coaches to the Pullman Company, Barney & Smith and the Ohio Falls Car Mfg. Co., is asking bids on 20 more coaches.

We are informed that the orders for 50 box cars for the Atlantic & Danville and six flat cars for the Erie & Central New York have been practically placed with the Lima Locomotive and Machine Co.

The Cudahy Packing Co., of South Omaha, Neb., and Chicago, has about decided to ask for bids on 100 cars. The particulars as to couplers, trucks and special equipment have not yet been decided upon.

We are officially informed that the report that the Boston & Maine is in the market for 1,500 freight cars is not true. This company is not in the market for any freight cars nor has it any freight cars under contract.

Swift & Co. will soon order 160 additional refrigerator cars. An order for 350 of these cars was recently placed with the Michigan-Peninsular Car Co., 50 of which have already been delivered. The 160 cars now to be ordered will make the total number so far ordered 510.

The Pennsylvania is building at Altoona 11 coaches which will have Pullman vestibules, Janney-Buhoup three-stem couplers, Gordon-Mitchell lamps for burning compressed gas, Edwards window fixtures, Wheeler seats and Forsyth roller curtains. The trucks will be the Pennsylvania latest standard four-wheel pattern, with 4¼ × 8-in. journals and will be equipped with two inside-hung National hollow brakebeams.

Messrs. Wells & French are overhauling 120 cars for the Alley Elevated (Chicago & South Side Rapid Transit) which are being fitted with the Sprague unit system for electric propulsion. These two cars will have two motors on one truck of each car, and a vestibule at each end so arranged that either end of any one car can become the leading end in any one train in which that car happens to be put, whatever the length of the train. The vestibule is arranged to fold back and make an open platform when it is not used for the protection of the motorman. Ten of these cars have already been delivered.

The Chicago, Burlington & Quincy has an order with Wells & French for 1,000 box cars of 60,000 lbs. capacity. These will be fitted with the Chicago, Burlington & Quincy metal body bolster, which has given great satisfaction in the last few years. The trucks will be of the regular Chicago, Burlington & Quincy arch bar type with a metal bolster designed by Mr. Forsyth. In general the car will be similar to the order for 2,000 built in 1895 and 1896 and will have the Chicago metal roof, the Chicago and the St. Louis couplers, air brakes and the Chicago, Burlington & Quincy standard buffer blocks. The castings throughout will be of malleable iron.

The Chicago, Milwaukee & St. Paul is building at the West Milwaukee shops 1,000 box cars, and we are informed by an official of that road that they expect to begin Oct. 1 to turn them out at the rate of 10 per day. This order is in addition to the 750 cars ordered some time ago. The cars now building will be C., M. & St. P. standard 34-ft. cars of 60,000 lbs. capacity. They will be equipped with Janney, Hien and Buckeye couplers, Westinghouse air brakes, Hutchins and double-board roofs, and the company's standard swing bolster trucks; the doors and journal boxes will be the company's standard, as also the brake beams, which will be the standard metal beams.

BRIDGE BUILDING.

Buffalo, N. Y.—It is said that the Park Commissioners have accepted the plans of H. A. Campbell for a new bridge of two 55-ft. spans, 51 ft. wide, to be built in Cazenovia Park. Estimated cost, $14,000.

Cincinnati, O.—The County Engineer has been instructed to make plans and specifications for two bridges on Muddy Creek road. E. L. Lewis, County Auditor.

Columbus, O.—Bids are asked until Oct. 6 for the sub- and superstructures and approaches of two county bridges. W. H. Halliday, County Auditor.

Cornwall, Ont.—In addition to the bridges across the St. Lawrence River, the Phœnix Bridge Co. has the contract for six other spans for the New York & Ottawa. They vary from 100 to 150 ft. in length.

Kingston, Pa.—The contract for a bridge over Toby Creek has been given to the Pennsylvania Bridge Co. The structure will cost about $1,100.

Mankato, Minn.—Bids are asked Oct. 5 for a bridge over Perch Creek, with a span of 45 ft. W. F. Brooks, County Surveyor.

New York.—The contract for a temporary bridge over Bronx River has been given Thielman & Smith, at $10,965. Other bids were: C. O'Grady, $11,060; Bernard Rolf, $11,005; A. B. Marshall, $11,855; Stephens & O'Rourke, $12,431; T. & A. Walsh, $12,820; C. W. Collins, $12,905; M. J. Leahy, $15,735.

Since our last issue, detailed tables of the bids opened Sept. 22 for the anchorages of the New East River Bridge have been received, and these enable us to correct an error in the figures we gave last week, and also give the bids for the Brooklyn anchorage in full. Jutte & Foley Co.'s bid for placing each pile 40 ft. or more below cut-off was $16 instead of $10, as given. The engineer's estimates for the New York anchorage were $877,000 for lump sum, $21,000 for piles, and $898,000 total. The complete bids for the Brooklyn anchorage were:

Bidders.	Lump sum.	Piles. Up to 20 ft. No.	Price.	Amount.	20 ft. to 30 ft. Price.	30 ft. to 40 ft. Price.	Over 40 ft. Price.	Total.
John J. O'Brien, D. D. McBean & Wm. J. McHale, 258 Broadway, New York	$687,621.00	432	$4.00	$1,728.00	$6.60	$10.00	$12.00	$689,349.00
Degnon-McLean Const. Co., 1 Broadway, New York	721,850.00	432	4.00	1,728.00	6 00	8.00	12.50	723,578.00
Joseph Hendler, 45 Broadway, New York	724,000.00	432	4.60	1,987.20	6.90	9.20	11.00	725,987.20
A. McMullen & Herbert Steward, 99 Cedar street, New York	793,000.00	432	6.50	2,808 00	8.00	9.00	14.00	795,808.00
M. J. Dady, 40 Court street, Brooklyn	813,362.00	432	25.00	10,800.00	30 00	40.00	50.00	824,162 00
P. J. Carlin & Co., 186 Remsen street, Brooklyn	874,670 00	432	10.50	4,536.00	11 50	12.50	17.00	879,206.00
J. C. Rodgers, 536 W. 152d street, New York	875,000.00	432	15.00	6,480.00	20.00	25.00	30 00	881,480.00
P. H. Flynn, 189 Montague street, Brooklyn	899,649 00	432	7.00	3,024.00	9.00	15.00	18 00	902,673 00
Bernard Gallagher, S. Fifth and Berry streets, Brooklyn	925,000.00	432	8.00	3,456 00	9 50	11.00	13.00	928,456.00
Charles Hart, 531 Third street, Brooklyn	958,574.00	432	12.00	5,184.00	18.00	25.00	27 00	963,758.00
John J. Cashman, 110 Milton street, Brooklyn	977,043.00	432	8 00	3,456.00	10.50	13 00	17 00	980,499 00
John McNamee, 16 Court street, Brooklyn	1,060,000.00	432	4 00	1,728.00	4.50	5 00	6 00	1,061,728.00
Jutte & Foley Co., 240 Water street, Pittsburgh	1,189,782.40	432	8.00	3,456.00	12.00	16.00	16.00	1,193,238.40
Stephens & O'Rourke, 44 Broadway, New York	1,190,000 00	432	8.00	3,456.00	10.50	13.00	15.00	1,193,456.00
Engineer's estimate	868,300.00	432	6.00	2,592 00	.....	.....	.....	870,892.00

Peoria, Ill.—The contract for a bridge across the Illinois River has been let by the Peoria & Pekin Traction Co., which is building 10 miles of road between these two places, to the Electrical Installation Co., of Chicago, the contractors for the whole construction.

Pottsville, Pa.—The special Committee of Councils has reported that a new wall and abutment at the Washington street bridge be built at an estimated cost of $5,612.

Rochester, Minn.—It is said that the City Council, having decided to build a new bridge over Zumbro River at Fifth street, has called for plans for a 200-ft. span steel structure to cost from $10,000 to $20,000.

Stapleton, N. Y.—The contract for a bridge over Palmer's Run, near Castleton, has been given to Philip Wolff & Son at $1,597, while the contract for a bridge over Lemon Creek, on the Amboy Road, has been awarded to C. A. Winant at $1,150.

Taylor Falls, Minn.—Reports state that it has been decided to finish plans for a bridge at the foot of the rapids so that bids may be asked. A. B. Plough, General Manager of the St. Paul & Duluth, is interested.

Toms River, N. J.—Bids are asked until Oct. 21 for an iron bridge with stone foundations over the Toms River at the foot of Main street. D. O. Parker can give information.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago Junction Railways & Union Stock Yards, quarterly, preferred, 1½ per cent., payable Oct. 1.

Chicago, Rock Island & Pacific, quarterly, 1 per cent., payable Nov. 1.

Delaware, Lackawanna & Western, quarterly, 1¾ per cent., payable Oct. 20.

Keokuk & Western, semi-annual, 1 per cent., payable Oct. 1.

Norfolk & Southern, quarterly, 1 per cent., payable Oct. 11.

Sandbury & Lewistown, 4 per cent., payable Oct. 1.

Utica & Black River, semi-annual, guaranteed, 3½ per cent., payable Sept. 30.

Metropolitan Traction, quarterly, 1¼ per cent., payable Oct. 6.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cleveland, Cincinnati, Chicago & St. Louis, annual, for election of directors, Cincinnati, O., Oct. 27.

Norfolk & Western, annual, for election of directors and other business, Roanoke, Va., Oct. 14.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of General Baggage Agents* will hold its seventeenth annual convention at Brown's Palace Hotel, Denver, Col., on Oct. 13.

The *American Railway Association* will hold its next meeting at the Holland House, New York, on Oct. 6.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *American Street Railway Association* will hold its sixteenth annual convention in Convention Hall, Niagara Falls, Oct. 19-22, 1897.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

American Academy of Railway Surgeons.

The fourth annual meeting of the American Academy of Railway Surgeons will be held in the Auditorium, Chicago, on Oct. 6, 7 and 8. Dr. R. Harvey Reed, Chief Surgeon of the Columbus, Sandusky & Hocking Valley, will consider the Rontgen rays "From a Medico-Legal Standpoint." Judge C. O. Hunter, General Solicitor of the Hocking Valley, will deliver a medico-legal address on "The Relations Between the Surgical and the Legal Departments of Railways." The officers of the Academy are: President, L. E. Lemen, M.D., U. P.; Secretary, D. C. Bryant, M.D., U. P.; Treasurer, C. B. Kibler, M.D., Erie.

Chicago Electrical Association.

The Chicago Electrical Association has issued a programme of the meetings which will be held during the months from October, 1897, to January, 1898, inclusive. The following papers will be presented: Oct. 1, "Economy in Electric Car Control." By Mr. James R. Cravath, President of the Cravath Manufacturing Co. Oct. 15, "Evolution of the Isolated Electric Plant." By Mr. Harold Almert, Electrical Engineer. Nov. 5, "The Safe Current Capacity of Electrical Conductors." By Mr. C. H. Sewall, of John A. Roebling Sons Co. Nov. 19, "Daily Mathematical Conveniences." By Mr. S. G. McMeen, Engineer, Central Union Telephone Co. Dec. 3, "Heavy Electric Traction." By Mr. Cloyd Marshall, Electrical Editor, *Street Railway Review*. Dec. 17, "Electricity in Ship Building." By Mr. C. C. Mattison, of Chicago Shipbuilding Co. Jan. 7, "Electrical Shop Transmission." By Mr. H. G. Dimmick, of Western Electric Co. Jan. 21, "The Art of Constructing Telephone Apparatus." By Mr. Henry P. Clausen, Electrician, Western Telephone Construction Co.

The officers of the Association for 1897-8 are: President, Mr. S. G. McMeen; Vice-President, Mr. F. S. Hickok; Treasurer, Mr. E. J. Jenness; Secretary, Mr. J. R. Cravath; Directors, Messrs. W. Clyde Jones, G. W. Knox and K. B. Miller.

The meetings will be held in Room No. 1737 Monadnock Block, Chicago.

Engineers' Club of Philadelphia.

A business meeting of this Club will be held on Oct. 2, at which the tellers will announce the result of the election of members, and by recommendation of the Board of Directors, a resolution will be offered for the appointment of a Committee on Legislation to act for the Club in public matters of interest to its members.

At the meeting held Sept. 18, in consequence of Prof. J. M. Porter's inability to present his paper upon "The Delaware River Bridge at Easton, Pa.," Dr. Henry Leffmann kindly consented to open a discussion upon the subject of clay. By means of blackboard formulas, Dr. Leffmann described the compositions of clay, and exhibited four samples of material in which the pure clay had been separated from foreign matters in a way to show the percentage of each. He described the physical formation of clay, and showed the character of rock from which the clay is obtained, by projecting thin sections upon the screens by means of the electric lantern with microscope and polarizing attachments. Mr. Joseph T. Richards exhibited and described lantern views of a small dam he had built in the neighborhood of Philadelphia, and lined satisfactorily with the clay found in that locality, and views of the larger dam at South Fork. Mr. Harrison Souder cited a case at Germantown, Philadelphia, where a perfectly water-tight dam was made accidentally by a pile of mica-schist and quarry refuse which had been dumped in a gully. Prof. Lewis M. Haupt called attention to the incompleteness of our information regarding clay, and stated that the best substance for reservoir lining was a mixture of 60 parts of gravel, 22 parts of sand and 18 parts of clay. He also called attention to the permanence of clay-banks in tropical countries, and the advantage of cutting out the clay vertically, instead of on a slop. Mr. John C. Trautwine, Jr., described the clay which had been got from the neighborhood to line the Queen Lane Reservoir, and attribute its porosity to the large amount of mica which it contained. Mr. Max Livingston called attention to the use of clay for the refining of certain oils.

Western Railway Club.

The first Fall meeting of the Western Railway Club was held Tuesday afternoon, Sept. 21, at the Auditorium Hotel, Chicago.

The paper presented at the May meeting by Mr. Thomas Appleton, entitled "Water Supply Stations for Locomotives" was first discussed. Two papers were then read, one by Mr. L. L. Smith, "How Can Shop Organization be Made More Efficient," the other by Mr. J. W. Gardner, "Machine Tools from Another Point of View."

Mr. Smith's paper is the result of an extended study of the shops of the Chicago, Burlington & Quincy R. R. with a view to introducing the piece-work system. The following are given as the principles underlying an ideal economical shop organization: First, to determine in detail how much each operation ought to cost; second, from this cost to ascertain how much work a man ought to perform to earn a day's wages; third, to see that the workman performs this amount of work. Mr. Gardner's paper pointed out several ways in which the present equipment of railroad machine shops could be made more efficient.

A banquet was held in the Auditorium Hotel at 6:30 o'clock, the number present being 140. Contrary to the usual custom there were few speakers and only short speeches were made.

The retiring President, Mr. Waitt spoke of the advancement by the club during the past year. This advancement he covered under four headings, namely, the officers, the club's standing in the community, the acquirement of property and the condition of the treasury. The officers chosen for 1897-98 include men from the transportation department and the technical school, as well as from the railroad motive power department. In the past the officers have mostly been mechanical men. The Western Railway Club is now the only incorporated railway club in the country and the only club which owns property. Reference was then made to the club library presented by the late David L. Barnes. The financial condition of the club during one year has greatly improved, so that at the present time there are ample funds in the treasury to cover all expenses, beside a separate fund set apart for the club library.

The committee of arrangements for the banquet consisted of Messrs. George S. Biglow, H. T. Biglow and J. C. Halladay, who provided a new feature in the vaudeville entertainment after the banquet.

Western Society of Engineers.

The members of the Western Society of Engineers, and ladies, to the number of 190 left Chicago Wednesday evening, Sept. 22 over the Grand Trunk, for Niagara Falls and New York. The party had a special train of seven Pullman sleeping cars and a baggage car. The programme of the trip included stops at Niagara Falls, South Bethlehem, Pa.; Easton, Pa.; Phillipsburg, N. J., and New York City.

The run over the Chicago & Grand Trunk was very slow, and considerable inconvenience and disappointment was caused by the failure of the road to make the promised time. It had been arranged to stop at Hamilton, Ont., for breakfast about 8 a. m., but that point was not reached until 11 a. m.

Niagara Falls was finally reached at 1 p. m. After lunch at the Cataract House the water-power plant of the Cataract Power Co. was inspected. After visiting the power plant the new arch bridge was inspected. This structure, which replaces the old suspension railroad bridge, is a magnificent example of modern bridge engineering. Many of the party took a trolley-ride down the Gorge Railroad, on the American side, to Lewiston, crossing the river at that point and returning by the trolley road on the Canadian side. The construction of the Gorge Railroad interested the members of the party from an engineering standpoint, as the roadbed has been cut out of the rock for most of the distance of seven miles. In the evening the power plant of the Niagara Hydraulic Power Co. was inspected.

The special train left Niagara Falls late Thursday evening over the Lehigh Valley Railroad for South Bethlehem, which was reached on schedule time Friday morning. At South Bethlehem the party were the guests of the Bethlehem Iron Co. After breakfast a train of fast cars, on which temporary seats had been built, conveyed the party through the various departments of the Bethlehem Iron Co. In the forge shop a gun jacket was being forged under the 5,000 ton hydraulic press and a large engine shaft under the 3,000-ton press. From the forge shop the train passed through the open-hearth department where a pour was made from one of the furnaces and a 20-ton ingot was cast. The operation of the compressor which is used to compress the molten steel in the ingot molds greatly interested the visitors. After an ingot mold is filled with molten steel it is placed under the plunger of the compressor where it is subjected to enormous pressure which squeezes the entrained gases from the metal and by pressing the metal down prevents the formation of a pipe in the center of the ingot. From the open hearth department the train passed through the plate mill which unfortunately was not running and from there through the armor plate mill. Here an armor plate for the battleship Texas was being forged under the great 14,000-ton hydraulic press. Very great interest was taken in this machine and in the triple expansion pumping engine which furnishes the power for it. The train was then pulled through the machine shop where were seen the different processes of turning and boring guns and machinery armor plates.

From Bethlehem the special train was taken to Coplay, Pa., where the works of the Saylor Portland Cement Co. were visited. From these works the train was taken to the mills of the Alpha Portland Cement Co. near Phillipsburg, N. J. At these mills lunch was served, after which the entire process of cement making from the quarrying to the final grinding and packing was shown and very fully explained by the officers of the company. The visitors were especially interested in this plant, for at the present time a very large proportion of the output is being shipped to Chicago to be used in the foundations of the new Post Office building.

After leaving here the party became the guests of the Ingersoll-Sergeant Drill Co., at Easton, Pa. At the station a train of trolley cars was awaiting to carry the visitors to the Paxinosa Inn, on the summit of Paxinosa Mountain. The view from this point is one of the finest in the state. Directly to the north the famous Delaware Water Gap is to be seen, while in the valley below flows the majestic Delaware River. This mountain view was especially enjoyed by the members of the party coming, as most of them did, from the great prairie region of Indiana and Illinois. At the Paxinosa Inn a splendid banquet was provided by the Ingersoll-Sergeant Co. Mr. Wm. Saunders, Vice-President of the company, acted as toastmaster, and made a very happy address of welcome. He called upon Mr. T. T. Johnston, President of the Western Society of Engineers, to respond to the first toast, which Mr. Johnston did briefly, but asked Mr. Isham Randolph to respond more at length. Mr. Randolph made one of his characteristic responses which was greatly enjoyed. After a number of informal after-dinner speeches the banquet broke up and the party was taken back to Easton. The factory of the Ingersoll-Sergeant Co. was run especially at night to enable the party to visit it during the entire evening. Much interest was taken in this plant, and it was quite late before the visitors finally returned to their train.

Some of the party after leaving the Ingersoll-Ser-

geant factory visited the interesting factory of the National Switch & Signal Co., under the guidance of Mr. Chas. Hansel, Vice-President and Mr. H. M Sperry, Signal Engineer of the company. Here was shown the 244-lever machine, which has just been completed for State Line, Ind., a station on the outskirts of Chicago. This is the largest interlocking machine ever built in this country. The visitors were also shown the Electric Train Staff that is in use on the C., M. & St. P. Ry., the C. & O. and the C., N. O. & T. P.; also the electric slot apparatus in use on the New York Central.

The party left Easton on their special train early Saturday morning, arriving at Jersey City at 7 a. m.

During the forenoon no special programme was followed out, but at 2 p. m. a special steamer took the party down the bay as the guests of the Dickinson Cement Co. The Brooklyn Navy Yard was visited, and the officers of the battleship Texas entertained the party on board their ship and explained the working of the machinery and guns.

The return trip to Chicago was begun early Sunday morning, so that the ride over the picturesque line of the Lehigh Valley would be made by daylight. The Lehigh Valley hauled the special train of the party free.

From Niagara Falls the return trip was made over the Chicago & Grand Trunk, arriving in Chicago Monday morning, Sept. 27.

PERSONAL.

—Mr. Morris Trumbull, formerly Auditor for the Receiver of the Wabash, died at his residence in Chicago Sept. 15.

—Mr. C. H. Goodrich has resigned as Assistant General Freight Agent of the Baltimore & Ohio Southwestern.

—Mr. John Ayer, for many years President of the Somerset Railroad, died at his home in Waterville, Me., Sept. 19 at 70 years of age.

—Mr. Ebenezer F. Parker, for 37 years Master of Transportation for the Norwich & Worcester, died at his home at Norwich, Conn., Sept. 21 at 85 years of age.

—Mr. W. H. V. Rosing, Master Mechanic of the First Division of the Denver & Rio Grande, at Denver, Col., has resigned, his resignation to take effect Oct. 1.

—Mr. William J. League, for many years Supervisor of Track on the Philadelphia, Wilmington & Baltimore, died at his home at Chase, Md., Sept. 15 at 55 years of age.

—Mr. C. H. Holdridge, Commercial Agent of the Seaboard Air Line, with headquarters at Pittsburgh, Pa., has been appointed Post Agent of the Ocean Steamship Co., with headquarters at New York.

—Mr. Robert A. French, Supervisor of trains and engines on the South Branch of the Baltimore & Ohio, died at Cumberland, Md., Sept. 15, at 77 years of age. He had been in the employ of the company for 48 years.

—Mr. Warren G. Purdy, the newly elected President of the Keokuk & Des Moines Line of the Chicago, Rock Island & Pacific, entered railroad service in 1859 as Clerk in the Illinoie Central office. He was made Bookkeeper in the Cashier's office of the Chicago, Rock Island & Pacific in 1867, and, after filling various positions, became Vice-President of that road in 1887, a position which he still holds.

—Mr. A. Ouellette, who has been made General Traffic Manager of the Drummond County Railroad, has been in railroad service since 1882. He served as Clerk of the local freight office, general stores department and then of the general freight agent's office of the Quebec, Montreal, Ottawa & Occidental until 1890, when he entered service with the Drummond County as General Freight and Passenger Agent.

—Dr. W. Koch, who in 1861 at the instance of the German Railroad Union founded the semi-weekly *Journal* of that organization, and has been its managing editor ever since, announces in the *Journal* of Aug. 28 his retirement on account of his advanced age (74 years). The *Railroad Gazette* and its readers owe a debt of gratitude to this venerable man, who has made his journal a treasury of trustworthy information concerning all European railroads and those of the outlying parts of the world, as well as of the great system of railroads which publishes it.

—In the death of Wm. Bradford Gilbert, of Palmyra, N. Y., on Sept. 6, passed away another veteran in the railroad history of the United States. He had attained the great age of 87 years, and for 50 years was in active service as civil engineer, beginning with the construction of one of the first railroads built—that between Schenectady and Albany in 1832. From that time onward he was identified with the location, construction and operation of some of the most important roads in the county, viz.: New York & Erie, Illinois Central, Ogdensburg & Lake Champlain, Rutland & Burlington, Syracuse & Binghamton, Milwaukee & St. Paul, New York Central, and New York & Oswego Midland. Three children survive him, one of whom is Division Superintendent F. W. Gilbert, of the Northern Pacific.

ELECTIONS AND APPOINTMENTS.

Ann Arbor.—At the annual meeting of stockholders, held at Durand, Mich., Sept. 18, the following directors were elected to serve three years: G. W. Quintard and Franklin B. Lord, New York; E. W. Tolerton, Toledo, O.; A. W. Wright, Alma, Mich., and William C. McClure, Saginaw, Mich.

Atlantic & North Carolina.—A new Board of Directors has been chosen. Governor Russell on the part of the State of North Carolina, which owns two-thirds of the stock, appointed W. H. Chadbourne, E. H. Meadows, Newbern; Daniel W. Patrick, Snow Hill; Dr. J. E. Person, Pikeville; T. D. Hewitt, Newport; W. H. Sawyer, Bayboro; J. F. Mewborne, Raleigh, and Robt. Hancock, Newbern. The stockholders elected N. M. Jurney, Dempsey Wood, J. M. Morehead, Thomas Daniels, J. A. Bryan, W. L. Kennedy, F. W. Hughes, J. W. Morehead. The last four were the nominees of the State Directors. Robert Hancock was made President to succeed W. S. Chadwick. L. J. Moore is made the proxy to vote the State's stock at stockholders' meetings.

Atchison, Topeka & Santa Fe.—G. C. Chambers, Traveling Passenger Agent, at Peoeia, Ill., has been transferred to St. Louis, Mo., to succeed H. N. Butterfield, resigned. W. F. Boyle has been appointed Traveling Passenger Agent, with headquarters in Chicago.

Baltimore & Ohio.—G. A. Cartwright, Assistant General Freight Agent of the Pittsburgh & Trans-Ohio Division, at Pittsburgh, Pa., having resigned, effective Sept. 20, to go into other business, the position is abolished. H. M. Matthews, Commercial Freight Agent, Pittsburgh has been promoted to Division Freight Agent, Pittsburgh & Wheeling Division. He will be succeeded by T. J. Walters, heretofore agent of the Continental Line, Pittsburgh Division.

The headquarters of George L. Hall, Division Engineer Maintenance of Way, have been removed from Grafton, W. Va., to Cumberland, Md., effective Sept. 27.

J. S. Norris, heretofore Train Master of the First Division, with headquarters at Baltimore, Md., has been made Superintendent of the Eastern District of the Pittsburgh Division, with headquarters at Connellsville, Pa. He will be succeeded by Charles Galloway, now Secretary to General Superintendent T. Fitzgerald at Baltimore.

Cincinnati, Hamilton & Dayton.—F. S. Young has been appointed Commercial Agent, with headquarters at Pittsburgh, Pa., to succeed W. A. Terry, resigned.

Drummond County.—A. Ouellette, General Freight and Passenger Agent, has been appointed General Traffic Manager, to take effect Oct. 1.

Franklin, Somerset & Kennebec.—The officers of this company, referred to in another column, are as follows: President, L. Atwood, Farmington, Me.; Vice-President, W. D. Hewitt; Treasurer, W. H. Ambler; Secretary, F. W. Butler.

Hendersonville & Brevard.—The new trustees (see another column) have appointed T. J. Rickman General Manager and T. S. Boswell Secretary, with headquarters at Hendersonville, N. C.

Keokuk & Des Moines.—W. G. Purdy has been elected President of this branch of the Chicago, Rock Island & Pacific, and also director to succeed Benjamin Brewster, deceased. H. H. Hollister has been elected a director to succeed W. H. Fisher, deceased.

Leavenworth, Kansas & Western.—At a meeting of the directors of this successor to the Kansas Central (see these columns for last week), held at Topeka, Kan., Sept. 17, the following officers were elected: President, A. L. Williams, Topeka; Treasurer, P. Clancey Anderson, New York. P. Clancey Anderson, George F. Warren and Alvin Krech, all of New York, were made an Executive Committee.

Lehigh Valley.—Because of the removal of the office of Assistant General Passenger Agent from South Bethlehem, Pa., to Philadelphia, W. H. Gunnere, the General Baggage Agent at South Bethlehem, has been made District Passenger Agent in addition to his present duties in the territory from Flemington to Glen Summit, including the coal branches. Chas. H. Heller, Traveling Passenger Agent, with headquarters at South Bethlehem, and H. Hermandes, Traveling Passenger Agent at Hazleton, will report to Mr. Gunnere.

The Lizard Creek branch, heretofore under the direction of Superintendent James J. Blakeslee, at Mauch Chunk, Pa., has been made a part of Superintendent Donnelly's division, whose headquarters are at Easton, Pa.

Michigan Central.—Clarke Haire, heretofore Assistant Superintendent of the Bay City Division, at Saginaw, Mich., has been appointed Assistant Superintendent of the Toledo Division, with headquarters at Toledo, O. This is a new office. His assistant will be W. J. Reynolds, heretofore Assistant Trainmaster.

Missouri Pacific.—H W. Stoutenborough has been appointed Contracting Agent, with headquarters at Omaha, Neb.

New York Central & Hudson River.—A. S. Weston, Assistant Roadmaster, with headquarters at Rochester, has been appointed General Roadmaster of the Rome, Watertown & Ogdensburg division from Oswego to Niagara Falls. The appointment goes into effect Oct. 1.

Pennsylvania Co.—At a meeting of the directors, held in Pittsburgh, Pa., Sept. 21, Joseph Wood, Fourth Vice-President, was elected Third Vice-President, to fill the vacancy caused by the death of John E. Davidson, and the office of Fourth Vice-President was abolished.

Pittsburgh & Lake Erie.—William L. Hager, for many years Contracting Agent of this company, has been appointed its General Agent, with headquarters at Pittsburgh. This is a new office.

Pittsburgh, Bessemer & Lake Erie.—Francis E. House, Chief Engineer, has been appointed General Superintendent in charge of the department of transportation, machinery and maintenance of way, with headquarters in the Carnegie Building, Pittsburgh. John S. Mathewson, Master of Transportation, has been made Superintendent of Transportation, with headquarters at Greenville, Pa., and the office of Master of Transportation has been abolished. These changes take effect Oct. 1.

St. Louis & San Francisco.—J. F. Constans, for many years connected with the Baltimore & Ohio, at Pittsburgh, Pa., has been appointed Traveling Freight Agent of the St. Louis & San Francisco, with headquarters at Pittsburgh.

Southern Pacific.—David R. Sessions has been appointed Claims Attorney, to succeed Byron Waters, resigned, with headquarters at San Francisco. The appointment took effect Sept 30.

Utah Central.—The new Receiver, George D. Loomis, has appointed Charles E. Stanton, of Salt Lake City, General Manager, with headquarters at Salt Lake City, Utah.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Ashland & Centralia.—This company was incorporated in Pennsylvania Sept. 24 for 999 years with a capital of $100,000 to build a line from Ashland, Pa., north about five miles to Centralia, both points being on the Lehigh Valley. The Directors are: Thos. M. Righter (President) and Voris Auten, Mount Carmel, Pa.; Geo. M. Smith, Morris Williams and C. Smith, Shamokin, Pa.; Henry S. Snavely, Junction, Pa., and Israel J. Erb, Lititz, Pa.

Baltimore & Ohio Southwestern.—This company will lay 5,000 tons of rail this fall.

Chicago & West Michigan.—It is reported that engineers have been engaged for some time in preliminary surveys of an extension of this road across Kalkaska County, Mich., east to Kalkaska village, a point on the Grand Rapids & Indiana, and that it is proposed to continue the extension eastward to a point on the Michigan Central.

Columbus Northwestern.—Surveys have been completed and work was begun on this new line Sept. 20. As projected the road is to extend from St. John, Anglaise Co., a point on the Ohio Southern, southeast, 53 miles through Lewistown and Bellefontaine to Marysville, where it is expected that arrangements will be made to enter Columbus over the tracks of the Cleveland, Cincinnati, Chicago & St. Louis or over the Pittsburgh, Cincinnati, Chicago & St. Louis division of the Pennsylvania Company's lines. It is expected to gain entrance to Lima over the Ohio Southern. The Ferguson Contracting Co., 69 Wall street, New York, has the contract for building the road. A large force of men is reported to be at work at St. Johns. J. J. Adams, Lima, O., is General Manager.

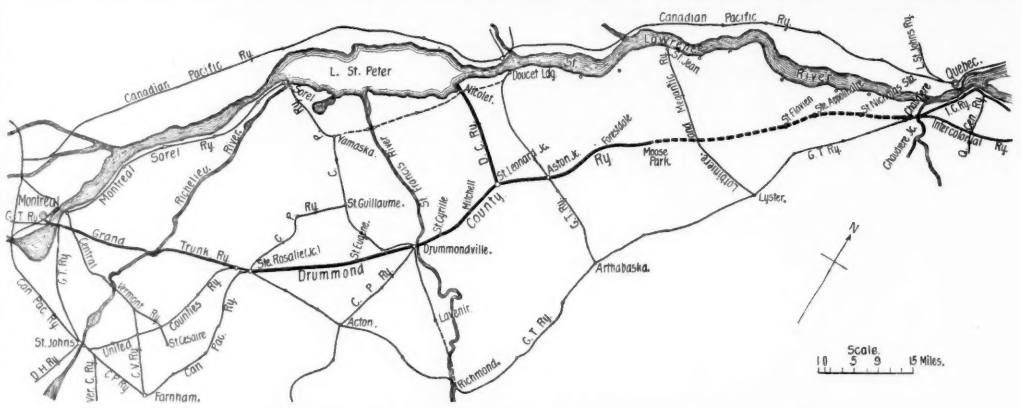
Detroit & Lima Northern.—The Ferguson Contracting Co., 69 Wall street, New York, has received the contract for building the extension of this road from Dundee, Mich., northeast 44 miles to Detroit. (See this column for Aug 13, under Detroit, Toledo & Milwaukee.) The contract includes grading, bridging, tieing and tracklaying. The company has opened offices at 1121 and 1122 Majestic Building, Detroit. A contract for a portion of the line has been sublet to the Russell-Lynch Co., Pittsburgh, Pa., and work was begun at Dundee, Sept. 21. It is expected that the road will be completed into Detroit in four months.

Erie.—This company is offering bonds on its New York & Greenwood Lake Branch for the purpose of double-tracking that road. The bonds are prior lien five per cent. guaranteed gold bonds due May, 1946, and are offered at 104. This branch extends from the New York & Greenwood Lake Junction to Sterling Forest, N. J., 39.3 miles, with a branch of 2.8 miles from Ringwood Junction to Ringwood, N. J.

Finleyville.—This company was incorporated in Pennsylvania Sept. 15, with a capital stock of $45,000 to build a line from Finleyville to Virginia Junction, Pa., both on the Baltimore & Ohio. James Henry Millholland, West Liberty, Pa., is President.

Franklin, Somerset & Kennebec.—Surveys have been completed and grading commenced for this road, which is to extend from Farmington, Me., south to Tidewater, about 40 miles. The contract for building has been let to the Franklin Construction Co., a corporation which recently obtained a charter under the laws of New Jersey. The road is not difficult to build. There are no bridges of importance except one of 280 ft. span across the Sandy River. This road when completed will connect the present narrow-gage road now terminating at Farmington with steamers to Boston. The names of the officers will be found in another column.

Intercolonial.—This Dominion government road is soon to have a direct connecting line from Quebec to Montreal by way of the Drummond County and Grand Trunk roads. Of this route 38 miles from Montreal east to St. Rosalie Junction is to be over the Grand Trunk, 115 miles from St. Rosalie Junction east to Chaudiere bridge, over the Drummond County, and the remaining eight miles to Quebec over its own tracks. The Drummond County from St. Rosalie Junction to Moose Park, 73 miles, together with a branch of 17 miles from St. Leonard north to Nicolet on the St. Lawrence River, has been completed since 1894. The extension of 42 miles from Moose Park to Chaudiere is now under construction. The company expects that it will be ready for traffic by Nov. 1. The alignment and grades of the Drummond County road are very favorable, there being no grade exceeding 53 ft. per mile and no curve less than 4 deg. The roadbed is 20 ft. in cutting and 15 ft. wide at sub-grade in the embankments. Ample drainage is provided by substantial steel structures resting on massive masonry spanning the large rivers, and steel plate girders, also resting on masonry spanning streams of lesser magnitude. The permanent way is laid with 56-lb. rails and well ballasted with very fine quality gravel. On the extension from Moose Park to Chaudiere the road has been graded and laid with 70-lb. rails and ballasted. All the streams are spanned by steel structures resting on masonry. W. Mitchell, Drummondville, Que., is the General Manager and J. H. Tessier is the Chief Engineer.



Drummond County Railroad and Intercolonial Connections with Montreal.

with a capital of $50,000, to build a line from Knoxville, Tioga Co., Pa., northwest about five miles up Troups Creek Valley to the New York state line. The officers and Directors are as follows: A. Dearman, President; A. W. Lugg, G. W. Fish, H. A. Ashton, A. E. Edgcomb, Giles Roberts, J. T. Gear and I. M. Edgcomb, Knoxville, Pa.; G. H. Tremain, Westfield, Pa.; W. W. Atwood, Addison, N. Y., and B. Van Ettenberg, 53 Broadway, New York.

Lehigh Valley.—Grading has been completed and the track is laid for a part of the Seneca County Railroad, an extension of the Lehigh Valley from Geneva Junction, Pa., northeast along the south shore of the Seneca River to Seneca Falls, eight miles. The portion graded and completed is from Geneva Junction to Waterloo, 5.2 miles. The grading has been done by John F. Dolan, contractor at Geneva. Chas. E. Webster, South Bethlehem, Pa., is Chief Engineer.

Little Kanawha Valley.—The first seven miles of this road have been completed and opened for traffic. The road as projected is to run from Parkersburgh, W. Va., southwest along the Little Kanawha River valley to Sutton, a point on the West Virginia & Pittsburgh. James Fuccy, of Weston, W. Va., has the contract for the first 40 miles from Parkersburgh.

Michigan & Ohio Belt Line.—This company has filed in Ohio amended articles of incorporation to enable it to build a line from Bryan, O., east through Williams, Fulton, Henry, Wood, Senaca, Sandusky, Huron, Erie, Lorain and Cuyahoga counties to a connection with the Cleveland & Mahoning Valley branch of the Erie.

Mississippi & Little Rock.—It is reported that surveys are being made to extend this road from Aurich, Ark., east to Duncan, a point on the Arkansas Midland, and from Ross west to Little Rock. The present line runs from Aurich west to Ross, 26 miles. R. W. Worthen, Little Rock, Ark., is Receiver.

New Mexico Railway & Coal Co.—At a meeting of the directors held at New York Sept. 27 it was voted to begin at once the building of this road from El Paso, Tex., north to the Salado coalfields of New Mexico, about 165 miles. C. D. Simpson, Scranton, Pa., is President.

New Roads.—The Itasca Lumber Co., of Minneapolis, Minn., has completed a railroad 20 miles long, running north from the most northerly water of the Mississippi River at Grand Rapids, Minn., to within about 50 miles of the Canadian line. Some 450,000,000 feet of timber will be cut along the line of the road this winter.

The Howe Lumber Co., of Duluth, Minn., is extending its railroad into 20,000,000 ft. of standing pine in the Vermillion Lake country. Seven miles of road will be built this fall, and another extension of 10 miles will tap another immense body of pine.

Pittsburgh, Bessemer & Lake Erie.—The cutting for the tunnel at Unity, Pa., has been completed, and as soon as the floor is cleared tracks will be laid through the tunnel. The tunnel is now timbered, and the lining will be put in place after the road has begun to be operated. It is officially announced that the road will be open Oct. 5, but recent delays make it probable that the opening will not take place until Oct. 15. The completed road is to run from Bessemer, Pa., north to Conneaut Harbor, O., on Lake Erie, and to Wallace Junction, Pa., with branches making a total of 228 miles.

Rio Grande Western.—It is reported that permission has been granted this company by the authorities at Washington to make surveys across the Indian reservations in Northeastern Utah. The grade at Soldier Summit is so heavy that the company is said to be seeking a new route on its main line between Denver and Salt Lake City.

Royal Oak, Southfield & Farmington.—It is stated that $20,000 of the $25,000 capital stock has been subscribed for this road in Oakland County, Mich. As projected, it is to run from Farmington east 12 miles to Royal Oak. The Directors are: Fred. A. Baker, Wm. H. Elliott, Charles A. Dean, Detroit; Fred. M. Warner, Farmington; Samuel D. Holcomb, Southfield, Mich., and C. O. Sprague, Northville, Mich.

St. Louis & San Joaquin Valley.—This company is arranging to extend its St. Paul Branch in Arkansas from St. Paul east about nine miles for the purpose of making connection into the valuable timber section. B. F. Yoakum, St. Louis, Mo., is Vice-President and General Manager.

San Francisco & San Joaquin Valley.—The surveyors are running a line from Stockton east toward San Francisco for its northern connection. A large portion of the extension will be through swamp land, requiring considerable filling. The terminus is to be at Point Richmond on the San Francisco Bay, opposite San Francisco. The company has sold $6,000,000 five per cent. bonds running 42 years from 1896.

Springfield, Ohio River & South Atlantic.—This company is being organized at Paoli, Ind., to build a portion of A. E. Boone's Black Diamond system. Wm. Kinley, of Toledo, O., is President, and A. E. Boone, of Zanesville, O., is Secretary.

Tennessee & Alabama Air Line.—This company has been organized in Missouri to build a line from New Madrid, Mo., on the Mississippi River southeast about 125 miles through Tennessee to Florence, Ala. Among the permoters is J. W. Eldridge, of Memphis, Tenn.

Tennessee Northern.—The first 12 miles of this road from La Follette, Tenn., southwest to Careyville have been completed and opened for traffic (see this column for Sept. 10). It is proposed to extend the road to a point on the Southern, near Coal Creek. Alfred A. Glasier, 104 Ames Building, Boston, is President and J. K. Sroufe, of La Follette, is Chief Engineer.

Wabash.—Surveys are being made according to report for a belt line at Detroit, Mich., to be owned jointly by the Wabash and Grand Trunk. The proposed line will run from the Wabash bridge over the Rouge River south to Wyandotte and back through Ecorse along the river. The estimated cost of the completed road, about 12 miles in length, is $200,000.

Electric Railroad Construction.

Albany, N. Y.—The Catskill Electric Railway Co. has filed with the Secretary of State a certificate of a proposed extension of its road for 30 miles from Cairo to Windham, and from Cairo in a northwesterly direction through Freehold to the northern limits of Oak Hill.

Baltimore, Md.—The Walbrook & Gwynn's Falls Railroad Co. was incorporated Sept. 20 by Max Brafman, F. Bernei, H. C. Tunis and others. The capital stock is $50,000, divided into a thousand shares of $50 each. It is proposed to build from Pennsylvania avenue and Pitcher street to the intersection of the city limits and the Windsor Mill road. There are now two lines to Walbrook, and it is said that the new road will shorten the running time between Baltimore and Walbrook.

Brooklyn, N. Y.—The Brooklyn Heights Railroad Co. are completing plans for the new electric line from Flatbush to Bath Beach.

Catskill, N. Y.—Mr. W. G. Raines has made application to the Railroad Commissioners for permission to build about 60 miles of electric road from Coxsackie through the Catskills to Middleburgh.

Chicago.—Mr. L. E. Myer, General Manager of the Peoria & Pekin Construction Co., with offices at 1116 Monadnock Building, Chicago, writes us that construction work on the Peoria & Pekin electric road is under way and that the entire contract, including power-house, bridge and equipment, has been awarded to the Electrical Installation Co., of Chicago. The road will be 11 miles long, extending from the Court House in Peoria, to the Court House in Pekin. Sixty foot 80-lb. T-rails, standard oak ties and the highest class of material will be used throughout. As noted among the bridge items, a bridge will be built across the Illinois River for the electric road.

Denver, Col.—The Denver & Rio Grande Railroad Co. has protested to the County Commissioners against the granting of a franchise to the Loretto Heights Railroad Co., on the ground that the proposed line crosses the Rio Grande road at two places.

Doylestown, Pa.—Construction work has been begun on the electric road from Willow Grove to Doylestown, which is being built by the Bucks County Railway Co. Bonds to the amount of $125,000 are being issued and a mortgage of that amount has been recorded in both counties through which the road passes. These are for 10 years at five per cent.

Fine View, N. Y.—Mr. C. C. Pierce, of Fine View, states that there is a good prospect of the proposed road between Thousand Island Park and Westminster Park being built in the near future. No company has as yet been formed, but those interested are securing option on certain vacant land and will organize as soon as practicable.

Fremont, O.—The Toledo, Bowling Green & Fremont Electric Railway Co. has made a proposition to build its lines to Fremont providing the city will furnish a station site and secure the right of way and take some of the bonds.

Herkimer, N. Y.—The electric road referred to among our notes last week will run between Herkimer and Little Falls through Jacksonburg and Herkimer. At the later place connection will be made with the Herkimer, Mohawk-Ilion & Franklin Railroad.

Hoboken, N. J.—The Hoboken Land & Improvement Co. has built an electric road for freight purposes along the river front connecting the steamship piers and warehouses with the Erie Railroad freight yards. It is expected that the road will be in operation by the end of this month. The road is built in a substantial manner so that the freight cars of the steam roads can be switched from the freight yards to the piers and warehouses. The road may eventually be extended to the piers of the Hamburg-American and Bremen lines. It is stated that the motor cars will have sufficient power to draw 10 loaded freight cars.

Lewisburgh, Pa.—The Lewisburgh, Milton & Watsontown Passenger Railway Co., with a capital of $125,000, has been incorporated. The line will run from Lewisburgh to Milton, crossing the Susquehanna River, thence to Watsontown and through the streets of the three towns mentioned, a total distance of 10 miles. The President is Henry V. Massey, Philadelphia, and the Directors are W. H. Hassenplug, William J. Burns, Philadelphia; Edgar A. Tennis, Thompsontown; Harry M. Van Zandt, Harrisburg.

Long Branch, N. J.—On Sept. 20, the Board of Commissioners granted a 99-year franchise to the Atlantic Highlands, Red Bank & Long Branch Electric Railway Co. The franchise gives the electric railroad company the right to lay a double track on Broadway as far as Martin street in Long Branch.

Montoursville, Pa.—The power house of the Montoursville electric road is nearly completed and the track construction has been finished. Four electric cars will comprise the rolling stock to start with and these will be heated by electricity.

Norristown, Pa.—The Schuylkill Valley Traction Co. has reconstructed its line between Bridgeport and Swedeland, a distance of about two miles. The line was built about four years ago and was in successful operation until a little over two years ago, when, under a decision of the Supreme Court in proceedings instituted by the Pennsylvania Railroad Co., it had to be abandoned.

New York.—Last week the Railroad Committee of the Board of Aldermen made a report in favor of the Third Avenue Railroad Company's application for a regrant of the Kingsbridge road franchise. This franchise is to be sold at public auction. At the last sale the Mertopolitan Street Railway Company was the rival bidder and forced the Third Avenue Company to pay 38½ per cent. of the gross receipts for the franchise. The Court of Appeals declared the franchise illegal after the company had spent about $2,000,000 on the road and power house.

The Metropolitan Traction Co. received orders last week to stop the building of the electric conduit road on Columbus avenue, on the ground that no franchise had been secured. Construction work on all the other routes, as previously mentioned, is being pushed to rapid completion.

Palo Alto, Pa.—The Borough Council has passed as ordinance granting additional privileges to the Schuylkill Electric Co. The work of changing and double-tracking a part of the line will be commenced very soon.

Pittsburgh, Pa.—A petition by the West End Traction Co. was presented to the Councils on Monday of this week asking permission to extend its lines on Mt. Washington. The company has completed a double track to the latter place, as previously mentioned among our notes, but no right of way has been secured for further extension. At present another company has a charter covering a part of the route asked for by the West End Traction Co.

Racine, Wis.—The Milwaukee, Racine & Kenosha Railway Co. has completed its tracks to the college grounds, but because of protests has not been able as yet to build past the college.

Sioux City, Ia.—Two ordinances were presented at the last meeting of the City Council providing for the extension of the franchises of two street railroad companies. The Morningside Electric Railway Company desires a 70-year extension and the Riverside Railway Co. for periods ranging from 19 to 29 years. No action in either case has been taken.

Westfield, N. J.—The Elizabeth & Westfield Railway Co. has asked for permission to build its tracks through Westfield and make connection with the lines of the Plainfield Street Railway Co. A public meeting will be held Oct. 8 to consider the matter.

GENERAL RAILROAD NEWS

Allegheny & Kinzua.—A letter received from the office of this company states that the line will probably be abandoned in about six months, owing to the fact that the principal traffic has consisted of lumber, which has been nearly all cut and hauled. The line connects with no towns of importance and there will be no traffic left that will pay to maintain the line. The road extends from Bradford, Pa., northwest to Red House, N. Y., 25 miles, with branches from Gilbert, Pa., to Coffee Run, 12 miles, and to Zeliff, Pa., six miles; a total of 43 miles.

Atchison, Topeka & Santa Fe.—The earnings for August and for the two months ended Aug. 31 were as follows:

August:	1897.	1896.	Inc. or dec.
Mileage	6,934.96	6 890.76	I. 44 20
Gross earn	$3,214,581	$2,678,461	I. $536,120
Oper. expen	2.293,300	1,926,506	I. 366,794
Net earn	$921.281	$751,955	I. $169.326
Taxes and rentals	145,423	189,684	D. 44.261
Surplus	$775,858	$562,271	I. $213,587
Gross earn	$5,808,812	$5,042,899	I. $765,913
Oper. expen	4,422.774	3,737,045	I. 685,729
Net earn	$1,386.038	$1,305,854	I. $80,184
Taxes and rentals	281,705	3 4.201	D. 7 ,496
Surplus	$1,104,333	$951,653	I. $152,680

Baltimore & Ohio.—The Receivers have made announcement that interest will be paid on Oct. 1 on the following bonds: (1) The semi-annual interest on the terminal mortgage bonds due June 1, 1897, 2½ per cent. on $8,500,000 coupons. (2) The semi-annual interest on the outstanding Chicago Division bonds, due June 1. (3) The semi-annual interest on the Columbus & Cincinnati Midland 4½ per cent. bonds, due July 1, 1896. (4) The semi-annual interest on the Parkersburg branch 6 per cent. bonds. (5) The semi-annual interest on the 1853 extended loan of $1,709,000 four per cent. (6) The semi annual interest on the Baltimore & Ohio equipment bonds series A. of $10,500. The proceedings begun several weeks ago in the United States Court for permission to bring suit in the Federal courts of Illinois, Ohio and Indiana for the appointment of a separate receiver for the Chicago division of the Baltimore & Ohio system, preliminary to the filing of an application for the foreclosure of the former property, will probably be discontinued if these payments are made. The receivers state that they will not pay the interest on the Philadelphia Division bonds of £2,400,000, as to do so they would have to pay 24 months' interest on those bonds out of 19 months' earnings.

Canadian Pacific.—The first mortgage bonds of the Canada Central, aggregating £10,400, have been called for payment on Oct. 1 at the office of Speyer Brothers, London.

Central of New Jersey.—The earnings for August were reported as follows:

August:	1897.	1896.	Inc.
Gross earn	$1,274,708	$1,163,195	$111,513
Oper. expen	683,096	670,782	12,314
Net earn	$591,612	$492.413	$99,199

Central Ontario.—By an order of the U. S. Circuit Court of the Northern Distrit of Ohio, Eastern Division, the following securities have been ordered to be sold at public auction at Cleveland, Nov. 6, to satisfy claims of Samuel J. Ritchie and others: 800 shares of preferred stock, 1,200 shares of common stock, $1,070,000 first mortgage six per cent.; $1,403,160 in first mortgage coupons and a $60,000 note; in addition to this 4,951 shares in the Canadian Copper Company and 9,509 shores in the Anglo American Iron Co.

Central Pacific.—The London Stockholders' Committee, consisting of F. G. Bambury, J. B. Akroyd, Alwine Compton, Daniel Marks, R. D. Peebles and Joseph Price, have made arrangements with the committee in New York to act in conjunction with themselves in the interest of the stockholders of this road. This committee consists of the following: August Belmont, Hon. John G. Carlisle and George Coppell.

Chicago & Northwestern.—At a special meeting of the stockholders, held at Chicago Sept. 22, it was decided to give the Board of Directors power to issue $165,000,000 in bonds at such time and at such amounts as the Board may determine necessary. These bonds are to mature Nov. 1, 1987, and to bear interest at not over five per cent. They are to be secured by a mortgage or deed of trust to such trustees as may be designated by the directors. The first issue of $20,000,000 at 3½ per cent. has been sold to Kuhn, Loeb & Co., of New York. The proceeds will be used to retire bonds maturing during the next five years. (See this column for July 16.)

Chicago, Milwaukee & St. Paul.—The earnings for August and for the two months ended Aug. 31 were reported as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn	$2,780,614	$2,524,366	I. $256,248
Oper. expen	1,688,488	1,678,602	I. 9,886
Net earn	$1,092,126	$845,764	I. $246,362
Two months:			
Gross earn	$5,494,007	$5,070,593	I. $423.414
Oper. expen	3,452,044	3,403,966	I. 48,078
Net earn	$2,041,963	$1,666,627	I. $375,336

Cincinnati, Jackson & Mackinaw.—The plan for reorganization issued Sept. 28 provides that holders of the first mortgage bonds are to receive 36 per cent. of the par value in certificates of interest of the Detroit, Toledo & Milwaukee, 30 per cent. in new first mortgage five per cent. bonds of the Cincinnati Northern and 34 per cent. in preferred stock of the same road. Holders of common stock are to receive Cincinnati & Northern common stock at the rate of one share for five.

Colorado Midland.—The Reorganization Committee gives notice to the holders of consolidated mortgage certificates representing four per cent. bonds that $50 will

be due on each certificate of $1,000, as a second installment, on or before Oct. 15, and $50 on each certificate as a third and final installment, to be paid on or before Nov. 15. By the terms of the reorganization these bonds are to be surrendered with a cash payment of 15 per cent. of their face value, the owners to receive 15 per cent. of new first mortgage 30 per cent. of preferred stock and 70 per cent. of common stock.

Columbus, Hocking Valley & Toledo.—The U. S. Circuit Court for the Southern District of Ohio, Eastern Division, has authorized the receivers to arrange with holders of the Columbus & Hocking Valley seven per cent. first mortgage bonds, due Oct. 1, 1897, to extend the same until Oct. 1, 1898, or for any longer period during which the property shall be in the custody of the court, with interest at six per cent., payable in gold on April 1 and Oct. 1.

Hendersonville & Brevard.—Receiver W. E. Shuford has surrendered this road to the trustees recently appointed by the Superior Court of Henderson County, N. C., at the instance of the creditors. The trustees are: T. J. Rickman, Chairman and General Manager; George A. Shuford, and W. A. Gash. The main office remains at Hendersonville. The road runs from Hendersonville, on the Western North Carolina Division of the Southern, to Brevard, 21.7 miles.

Illinois Central.—Fifty sterling five per cent. sinking fund bonds have been drawn to be redeemed at par on Oct. 1 at the office of Morton, Rose & Co., London.

Indiana State Line Railway.—This company has been organized in Illinois as a consolidation of the Chicago Junction Railway & Union Stock Yards Co. and the Chicago, Hammond & Western Belt Line, whose consolidation was noted in this column for Sept. 3. It is stated that the two companies will not be operated as one for some 30 or 60 days. C. W. Lane, of New York, has been elected President and S. S. Whitehead Vice-President of the new company.

Lancaster & Strasburg.—This road was offered at public sale in Strasburg, Pa. The highest bid offered was $11,600, when the road was withdrawn from sale. It is expected that it will be disposed of at private sale. The road runs from Seaman Place, Pa., southwest about five miles to Strasburg.

Milwaukee, Benton Harbor & Columbus.—A mortgage of $900,000 has been executed by this company to secure the issue of $800,000 consolidated five per cent. bonds to run 50 years. This is the road now under construction to run from Benton Harbor, Mich., southeast to Napanee, Ind. (See these columns for Aug. 13.)

Northern Central.—The earnings for August and for the eight months ended Aug. 31 were as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn	$635,098	$516,396	I. $118,702
Oper. expen	386,432	371,764	I. 14,668
Net earn	$248,666	$144,632	I. $104,034
Eight months:			
Gross earn	4,209,186	3,965,187	I. 243,999
Oper. expen	2,982,052	3,051,851	D. 69,799
Net earn	$1,227,134	$913,336	I. $313,798

Old Colony.—At the annual meeting of this leased line of the New York, New Haven & Hartford, held at Boston Sept. 28, it was voted that the directors be authorized to provide means for paying any debts of the company and for the payment of money borrowed by an issue of bonds or notes of the company not exceeding $1,000,000, to bear interest at a rate not exceeding six per cent., payable not exceeding 50 years from their date, said bonds and the interest thereon to be payable in gold coin if the directors deem best.

Pennsylvania.—The first mortgage seven per cent. bonds of the Sunbury & Erie, a branch of the Philadelphia & Erie Division of this road maturing Oct. 1, will be paid at maturity in the office of the Pennsylvania at Philadelphia.

Peoria, Decatur & Evansville.—The first mortgage bondholders' committee, of which Walston H. Brown is Chairman, has published the following plan of reorganization: New securities, $2,757,000 first mortgage five per cent. 50-year gold bonds, being the same amount as is now outstanding on the Peoria and Evansville divisions; $3,000,000 five per cent. preferred stock; $8,400,000 capital stock. First mortgage bondholders will receive 100 per cent. in new bonds, 10 per cent. in preferred stock and back interest in cash. Second mortgage bondholders will receive 112½ per cent. in preferred stock upon paying an assessment of 25 per cent. Stockholders will receive 100 per cent. in new common stock upon paying an assessment of five per cent., for which assessment they will receive preferred stock at par. Securities are to be deposited with the Central Trust Co., New York.

Philadelphia & Reading.—The earnings for August and for the two months ended Aug. 31 were as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn	$1,888,538	$1,787,019	I. $101,519
Oper. expen	1,035,082	1,003,698	I. 31,384
Net earn	$853,456	$783,321	I. $70,135
Coal and Iron Co	108,396	63,954	I. 44,442
Reading Co.	27,326	27,326	.....
Total net earnings	$989,178	$874,601	I. $114,577
Fixed charges *	745,000	840,351	D. $95,351
Surplus	$244,178	$34,250	I. $209,928
Two months:			
Gross earn	$3,805,134	$3,539,832	I. $265,302
Oper. expen	2,102,3 3	2,013,137	I. 89,166
Net earn	$1,702,831	$1,526,695	I. $176,136
Coal and Iron Co	268,840	130,730	I. 138,110
Reading Co	58,688	58,688	.....
Total net earn	$2,030,359	$1,716,113	I. $314,246
Fixed charges *	1,490,000	1,680,703	D. 190,703
Surplus	$540,359	35,410	I. $504 949

* Estimated for 1897.

Richmond, Nicholasville, Irvine & Beattyville.—The United States Circuit Court has fixed the date of the sale of this road for Oct. 11. (See this column for Aug. 13.) The upset price has been reduced from $250,000 to $160,000. The road runs from Versailles, Ky., to Irvine, 61 miles. It has been in the hands of a Receiver since Dec. 2, 1891.

St. Louis & San Francisco.—The earnings for August and for the two months ended August 31 were reported as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn	$615,305	$515,396	I. $99,909
Oper. expen	315,097	276,438	I. 38,659
Net earn	$300,208	$238,958	I. $61,250
Two months:			
Gross earn	$1,143,800	$1,004,465	I. $139,335
Oper. expen	648,120	$552,971	I. $95,119
Net earn	$195,680	$451,494	I. $44,186

Southern.—The earnings for August and for the two months ended Aug. 31 were as follows:

August:	1897.	1896.	Inc.
Mileage	4,827.22	4,754.30	72.92
Gross earn	$1,604.558	$1,442,002	$162.556
Oper. expen	1,132,932	1,021,693	111,739
Net earn	$471,726	$120,909	$50,817
Two months:			
Gross earn	$3,088.122	$2,865,677	$222,445
Oper. expen	2,240,312	2,116,892	123,420
Net earn	$847,810	$748,785	$99,025

Toledo & Ohio Central.—The earnings for the year ended June 30 were as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earn	$1,750,979	$1,944,503	D. $193.524
Oper. expen	1,285,275	1,326,658	D. 41,383
Net earn	$465,704	$617 845	D. $152,141
Other income	8.208	9,533	D. 1,325
Total	$473,912	$627,378	D. $153,466
Charges	467,475	469,564	D. 2,089
Balance	$5 437	$157,814	D. $151,377

Union Pacific.—The Reorganization Committee states that it has been able to make certain concessions desired by the government, and that the sales will now proceed without interference on the part of the Attorney-General. The sale will probably be made between Nov. 1 and Nov. 5.

The New England Trust Company, of Boston, filed a bill in equity against the Union Pacific and its Receivers, Sept. 25, asking that the Court authorize them to sell certain securities placed with the complainants in April, 1893. The property was deposited as collateral for the payment of five per cent. bonds of the Union Pacific issued for the purpose of paying off the floating debt. The following are the securities: Denver, South Park & Pacific, $1,544,000; Kansas Central, $2,356,000; Utah & Northern, $2,353,000; Omaha & Republican Valley, $419,000; Utah & Southern Extension, $975,000.

Utah Central.—George D. Loomis, of Salt Lake City, Utah, was appointed Receiver of this road Sept. 17, to succeed James McGregor, of Salt Lake City, and Clarence Cary, of New York. This road was offered for sale on May 8, and an option was given by the Rio Grande Western to purchase it for $550,000 in bonds. This offer has been accepted and the transfer is to be made Dec. 17. The road will be in charge of Mr. Loomis until that date. The road is narrow-gage and extends from Salt Lake City to Park City, Utah, 32 miles, with branches from Park City east seven miles and from Salt Lake City six miles.

Wabash.—The earnings for August and for the two months ended Aug. 31 were reported as follows:

August:	1897.	1896.	Inc. or Dec.
Gross earn	$1,218,181	$1,063,203	I. $154 978
Oper expen	770,327	710,475	I. 59,852
Net earn	$447,854	$352,728	I. $95.126
Two months:			
Gross earn	$2,188,816	$2,108,702	I. $80,114
Oper. expen	1,411,526	1,440,659	D. 29,133
Net earn	$777,290	$668,043	I. $109,247

West Virginia, Central & Pittsburgh.—The earnings for the year ended June 30 were reported as follows:

Year:	1897.	1896.	Inc. or Dec.
Gross earn	$604,347	$612,689	D. $8,342
Oper. expen	413,144	396.790	I. 16,354
Net earn	$191,203	$215,899	D. $24,696
Piedmont & Cumberland*	5,158	10,633	D. 5,475
Profit from coal mining	77,665	102,607	D. 24,942
Total net earn	$274,026	$329,139	D. $55,113
Charges	180,000	202,253	D. 22,253
Balance	$91,026	$126,886	D. $32,860

*Leased line.

Electric Railroad News.

Cincinnati, O.—It is stated that the Fidelity Trust Co., of Louisville, has completed the deal for a sale to the Cincinnati Street Railway Co., and nearly all the second mortgage bonds of the Cincinnati Incline Plane Railway Co., known as the Main street line. Negotiations have been pending for a long time for the transfer of this road.

Detroit, Mich.—The Detroit, Lake Shore & Mt. Clemens Railway Co. has executed a $260,000 mortgage to the New York Security & Trust Co., of New York City, which has been filed in the Register of Deeds' office.

Gettysburg, Pa.—On Tuesday of this week a hearing was given to hear the protest of the West End Trust & Safe Deposit Co., of Philadelphia, Receiver of the Gettysburg Electric Railway Co., against the organization of a new corporation by the purchasers of the franchises of the Electric Light, Heat & Power Co., of Gettysburg, which was sold by the sheriff on May 1 last. The railroad company claims that they own the plant and machinery which was leased to the Electric Light Co.

TRAFFIC.

Traffic Notes.

The Southern Pacific announces at San Francisco that 3,000-mile tickets will hereafter be sold at $75, the rate heretofore having been $90, with a rebate of $15. It is said that this loosening of restrictions is due to competition of the San Francisco & San Joaquin Valley Railroad.

The Interstate Commerce Commission has held inquiries at Kansas City, Chicago and Cleveland on the complaint of the American Warehouse Men's Association against the railroads for giving free storage of freight, and a hearing is to be held in New York City. At Cleveland a warehouseman testified that he had formerly earned $150 a month storing paper for the daily newspapers, but that now he earned nothing, the railroads giving storage free. A. M. Simmons, formerly Manager of the Cleveland Car Service Association, testified concerning the demurrage rates of that Association, stating that the railroads discriminated between shippers by making different rates for different kinds of freight.

Freight rates from New York to St. Paul by rail and lake have been reduced from 56 cents (first-class) to 35 cents, the lines responsible for the reduction being, it is stated, the Great Lakes Steamship Co. and the Wisconsin Central Railroad. It is said that rail and lake rates are so low that the westbound freight business by canal and lake has been considerably reduced. The New York *Journal of Commerce* reports that the total rail and lake shipments out of New York from April 8 to Sept. 7 amounted to 139,184 tons, which is about 26,000 tons more than last year. For the same period the total all-rail shipments westbound from New York are given as 446,704 tons this year and 427,220 tons last year.

Lake Superior Notes.

Lake freight rates from Lake Superior points on both ore and wheat have advanced to a 65 cent ore basis. There is every probability of another advance shortly.

Iron ore shipped from Minnesota to date this year amounts to about 4,750,000 gross tons, and from the entire lake region to about twice that. Shipments have materially fallen off, but the total shipments for the year will probably reach 11,500,000 tons, or more than 1,000,000 tons in excess of any preceding year. The Gogebic Range has already shipped more ore than it sent down all last season, with two months yet to work.

Wheat is now coming into Duluth at the rate of 12,000,000 bu. a month, but the amount of grain in store there has only increased about 350,000 bu. in two weeks, showing a forward movement for the fortnight of over 5,000,000 bushels. Much of this wheat is sold for foreign delivery. Cash wheat is worth one cent more than for May delivery, and receipts at Duluth and Minneapolis for some time to come are likely to aggregate 1,500 to 1,600 cars a day, of which the Great Northern road alone is expected to handle almost half.

A Long and Short Haul Decision.

The Interstate Commerce Commission has announced its decision of two long and short haul cases in an opinion by Commissioner Knapp, the case of Powell against the Alabama & Vicksburg and the matter of coal rates charged by the Alabama & Vicksburg and the Alabama Great Southern. These cases involved the transportation of coal from Corona, Birmingham and Blocton, Ala., to local points in Mississippi on the Alabama & Vicksburg at higher rates than were charged for longer distances over the same line to Jackson and Vicksburg, Miss. The various roads agreed upon the rate to Jackson, which rate was less than was charged on coal to shorter distance points over the same line. This was held to violate the fourth section of the act. Coal from Alabama mines to Vicksburg must go by railroad and the competition is with coal brought over long distances down the Ohio and Mississippi rivers from the Pittsburgh (Pa.) district. This competition was held not to be rail and water competition for transportation from the same locality, but the competition of markets, the force and effect of which is determined by commercial considerations and wholly disconnected from the circumstances and conditions under which transportation is conducted.

Chicago Traffic Matters.

CHICAGO, Sept. 29, 1897.

The Interstate Commission took but little testimony here in the American Warehousemen's Association case. Only Chairman Morrison and Commissioner Yeomans were present. On Thursday morning, after an hour or two's sitting, Mr. Morrison announced that as all the witnesses were admitting the charges of the warehousemen that they stored freight longer than 48 hours it was a waste of time to take further testimony. The attorneys will submit briefs for and against the right of the railroads to store freight free. On Saturday the Commission heard the charges preferred by the Northwestern Iowa Grain Association, but the case was dropped for lack of witnesses and failure of attorneys to appear.

The Alton and the Wabash for some days past have been having a little contest over Peoria-Chicago passenger rates, and the round-trip fare has come down to $4.

The Wisconsin Central announces a proportional tariff on grapes in carloads from Chicago to St. Paul of 12 cents per 100 lbs., and has advised the Interstate Commerce Commission that the reduction was forced by the fact that the other roads were paying commissions to shippers.

The Western roads have formally resolved to adopt an in interchangeable mileage ticket and Chairman Caldwell is authority for the statement that the Sebastian ticket will be used.

The Santa Fe traffic officials are trying to have a joint office established at Kansas City for the handling of stock drovers' passes, which are manipulated by shippers.

A meeting of all the Western roads, called for the purpose of considering the rate situation, was held yesterday at the office of Chairman Caldwell, of the Western Passenger Association. The Southern Pacific, the Great Northern and the Northern Pacific were not represented, so that nothing was done toward restoring transcontinental passenger rates. The action of the Union Pacific in severing through passenger arrangements with the Oregon Short Line has produced considerable disturbance in rates. Eastbound rates from Portland over the Great Northern were first reduced, and then the Northern Pacific made a reduction of $4.50 on first class and $9.50 on second.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western termini of the trunk lines for the week ending Sept. 23 amounted to 55,092 tons, as compared with 65,222 tons the preceding week. This statement includes 19,358 tons of grain, 2,560 tons of flour and 10,954 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING SEPT. 23.		WEEK ENDING SEPT. 16.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio	3,299	6.0	2,718	4 2
C., C., C. & St. Louis	2,908	5.3	3,481	5.3
Erie	5,179	9.4	8,987	13.8
Grand Trunk	7,195	13.1	9,298	14.2
L. S. & M. S.	6,367	11.5	6,470	9.9
Michigan Central	6,040	11.0	7,899	12.1
N. Y., Chi. & St. L.	4,783	8.7	5,668	8.7
Pitts., Cin., Chi. & St. Louis	3,667	6 6	3,366	5.2
Pitts., Ft. Wayne & Chicago	9,831	17 8	9,531	14.6
Wabash	5,823	10.6	7,804	12.0
Totals	55,092	100.0	65,222	100.0

Lake shipments last week were 124,929 tons.